JUNE 16, 1952

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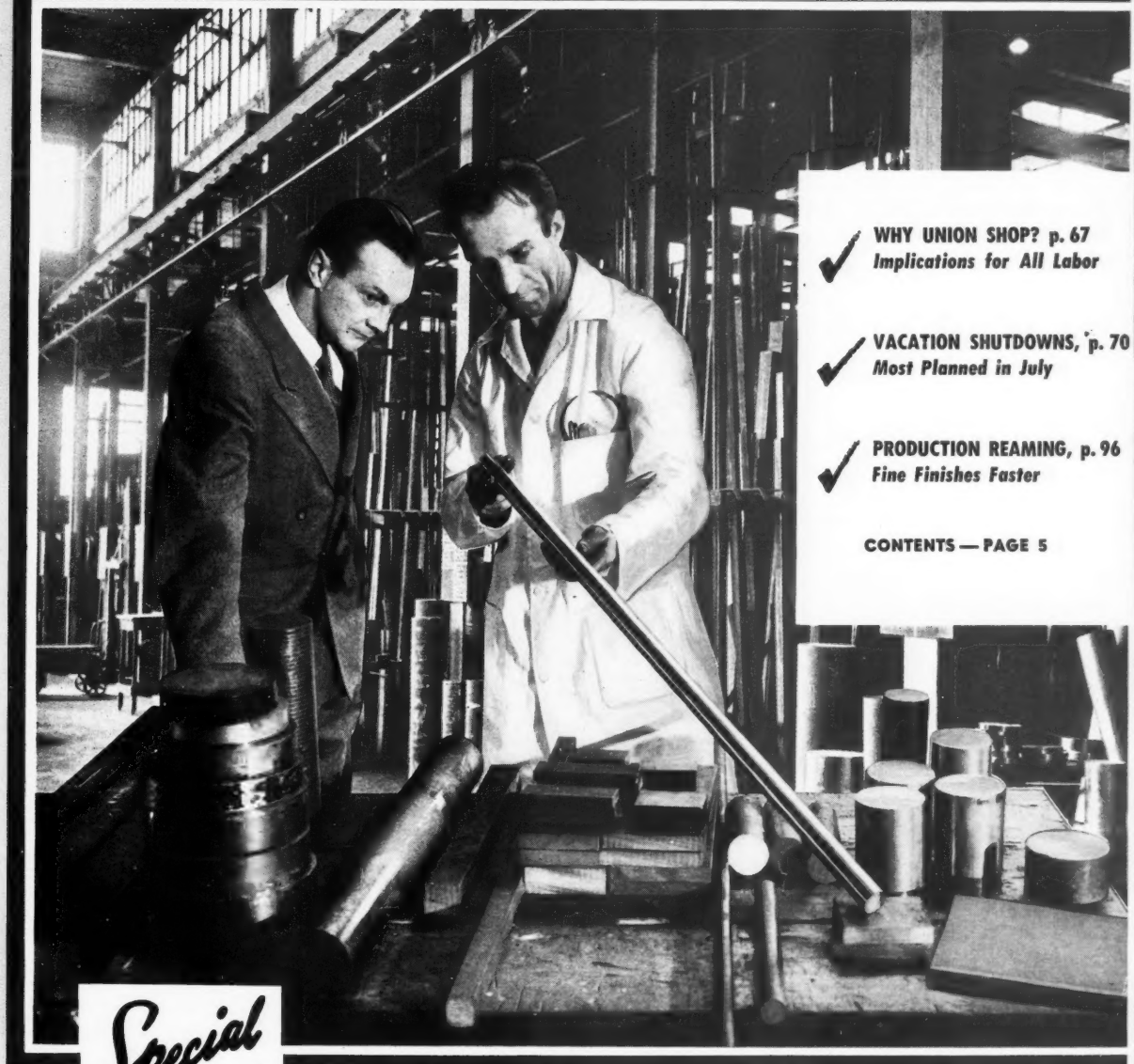
STEEL

THE WEEKLY MAGAZINE OF METALWORKING



✓ **WHY UNION SHOP? p. 67**
Implications for All Labor

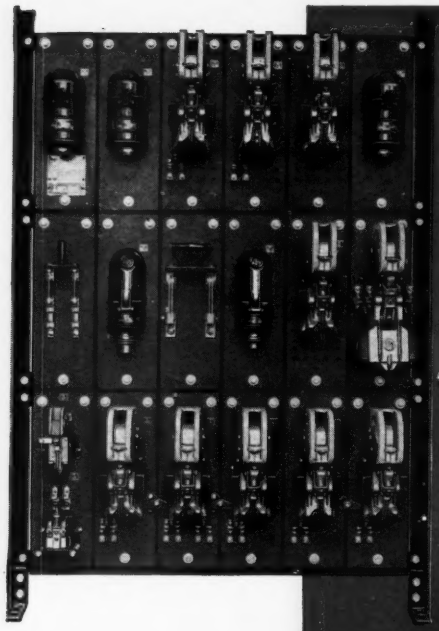
✓ **VACATION SHUTDOWNS, p. 70**
Most Planned in July

✓ **PRODUCTION REAMING, p. 96**
Fine Finishes Faster

CONTENTS — PAGE 5

Special Report

32-Page Guide for Selecting Tool Steels and Carbides
Opposite page 106



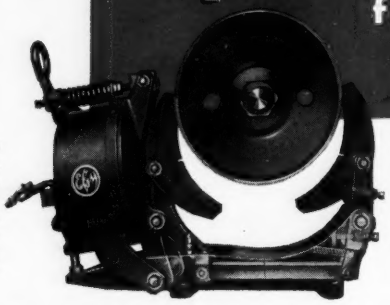
LOOK for these NAMES when buying Motor Control

1 LINE-ARC Contactors
2 TIME-CURRENT Acceleration (D-c)
3 FREQUENCY RELAY Acceleration (A-c)
4 WRIGHT CIRCUIT Hoist Control (D-c)
5 YOUNGSTOWN Hoist Limit Stops
6 TYPE WB Brakes
7 CAM Master Switches
8 MANUAL-MAGNETIC Disconnect Switches
9 CONTRA-TORQUE Hoist Control (A-c)
10 TAB-WELD Resistors

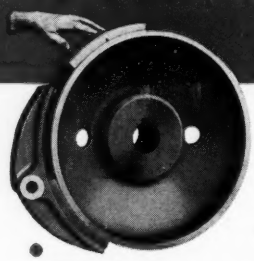
These FUNCTIONAL NAMES *Speak for Themselves*

TYPE WB Brakes

Long Life Brakes for A-c and D-c Motors

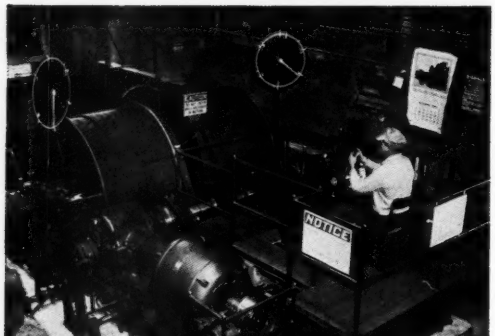


Type WB Brake showing how the motor armature is easily lifted out. At top left is the handle-nut for compressing the spring when removing motor armature, changing brake shoes and for manual control.



The brake lining is molded to match curvature of wheel and shoe.

Actual wearing thickness, between rivet heads and brake wheel is 1/8" on the smallest size to 7/16" on the largest size.



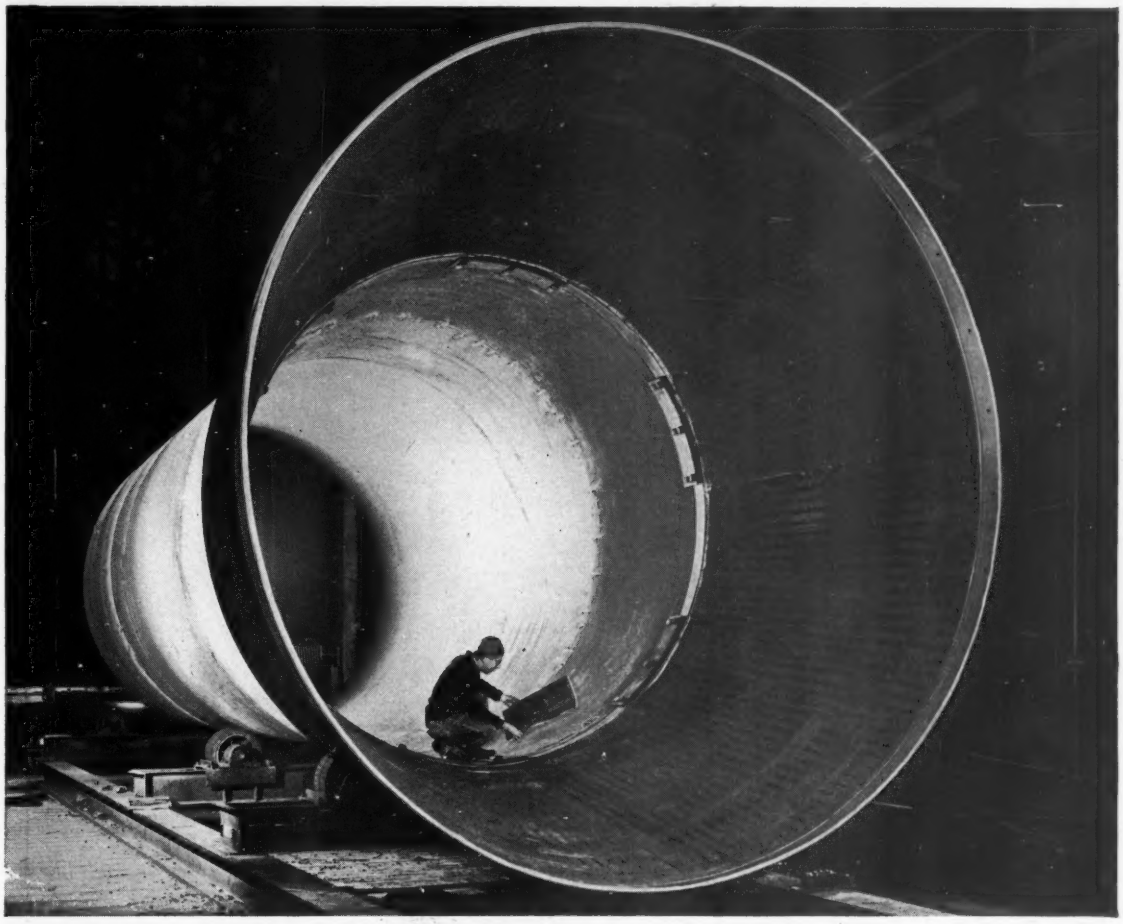
A-C Mine Hoist Motor with WB Brake.

These Type WB Brakes use a block type lining which is both thick and tough.

Furthermore, due to the process of manufacture, the blocks have proper frictional quality *throughout the entire thickness*, permitting uniform and complete wear down to rivet heads. And since the material is non-compressionable, brake adjustments are infrequent.

Write for Bulletins 1004 and 1006.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO



Kiln Section Made by Welding

This is a repair section for a rotary kiln. It consists of these three elements: (1) a cone, 9 ft, 6 in. long, formed from 1¼-in. steel plate; (2) a riding ring, 6 ft long, formed from 2½-in. plate, and (3) three shells, 21 ft, 6 in. long, formed from ¾-in. plate. The maximum diameter of the cone is 15 ft. The diameter of the riding ring and shells is 11 ft, 6 in. The complete assembly, weighing 76,467 lb, was produced by welding.

Kiln sections may be far removed from the type of equipment used in your business. But whatever the type of machinery you build, you'll find it worth while to look into the advantages of Bethlehem Weldments.

With Bethlehem Weldments, excess weight is eliminated, without any sacrifice of rigidity. This weight-reduction also represents a saving in the cost of the finished machine.

Bethlehem Weldments are extremely versatile, too. They can be produced as simple parts or intricate assemblies, and in practically any size. They permit freedom of design, for the steel from which they are made can be bent, pressed or shaped prior to welding, without damage to the physical structure of the steel. What's more, Bethlehem Weldments can be used either alone, or combined with forgings or castings.

If you would like to discuss the possibility of using Bethlehem Weldments, contact the nearest Bethlehem office and we will arrange for a representative to call.

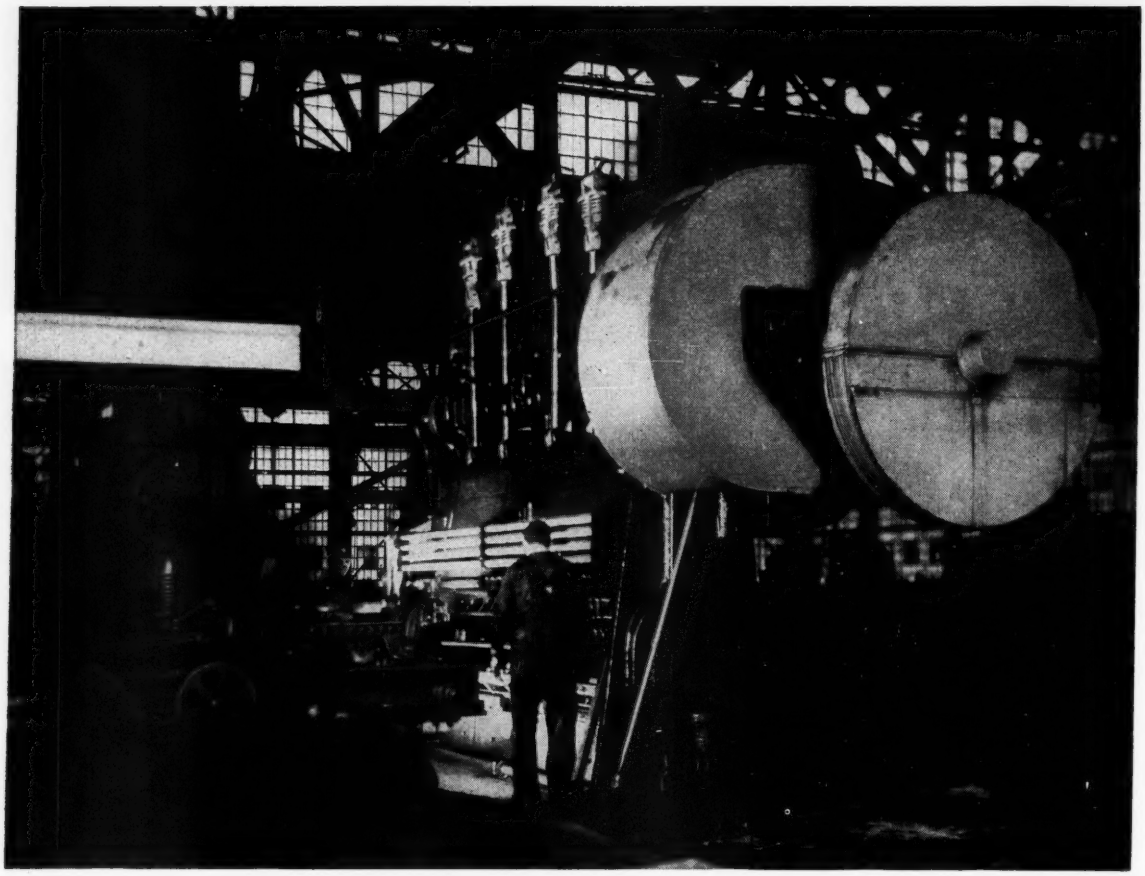
BETHLEHEM STEEL COMPANY

BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM WELDMENTS

BETHLEHEM STEEL



How to get structural steel with a punch

The literal way to do it is on a punch press.

But figuratively speaking, it takes much more than a punch press to put punch, or stamina, into structural steel. It takes quality control from blast furnace to end product... the kind you get from a team operation like Barium Steel Corporation.

That's the real punch behind this giant punch press at Barium's Phoenix Iron & Steel Company, which punches steel plate and structural steel. Phoenix Bridge Company, a subsidiary of Phoenix Iron & Steel, uses these products for constructing and engineering bridges, buildings, and other fabrications.

If these two companies can't solve your particular steel need, you'll probably find the answer elsewhere in the Barium family. Barium's fifteen member companies supply industry with steel in many forms, and are ready to work as a self-contained unit to speed urgently needed orders.

Address your steel problem to Barium Steel Corporation at 25 Broad Street, New York City.

BOLTS — Bayonne Bolt Corporation

STEEL PLATE — Central Iron and Steel Company

PIG IRON — Chester Blast Furnace

CRANES AND HOISTS — Clyde Iron Works, Inc.

SPRINGS — Cuyahoga Spring Company

BOLTS AND NUTS — Erie Bolt and Nut Company

METAL STAMPINGS — Geometric Stamping Company

DROP FORGINGS — Globe Forge, Inc.

HEAVY FLAT DIE FORGINGS — Industrial Forge and Steel, Inc.

AIRCRAFT ENGINES AND PRECISION ASSEMBLIES — Jacobs Aircraft Engine Company

MARINE DIESEL AND GASOLINE ENGINES — Kermath Manufacturing Company, Kermath Limited (Canada)

STRUCTURAL SHAPES AND STEEL FABRICATIONS — Phoenix Bridge Company, Phoenix Iron and Steel Company

BARGES AND TUGS — Wiley Manufacturing Company

Proved by users from coast to coast . . .

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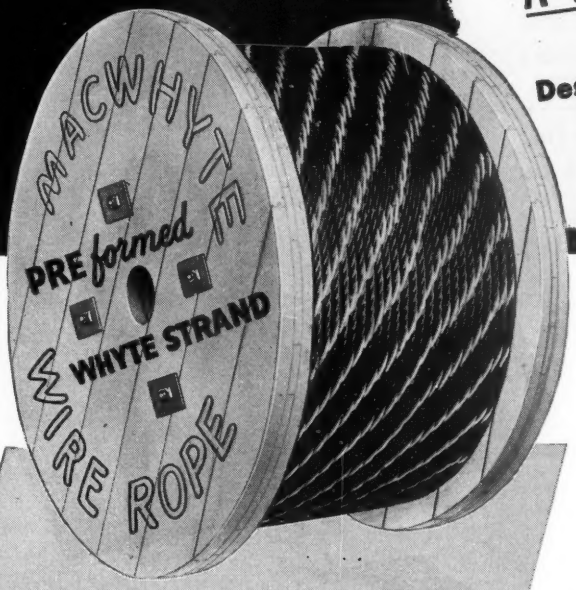
A THOUSAND AND ONE

different ropes
Designed right—made right
PREformed and
internally lubricated



1018

EVERY REEL of Macwhyte Wire Rope reflects a pooling of users' experience. Over the years this experience has been studied in the field by Macwhyte engineers. Your requirements dictate the design and making of Macwhyte Wire Rope for all equipment.

Recommendations for your particular needs are promptly available either from Macwhyte Distributors or Macwhyte Company.

ASK FOR CATALOG G-15

MACWHYTE COMPANY

KENOSHA, WIS.

MACWHYTE COMPANY, 2912 Fourteenth Avenue, Kenosha, Wis. Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope and Wire Rope Assemblies. Mill depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles • Distributors throughout U.S.A.

Simple Solution

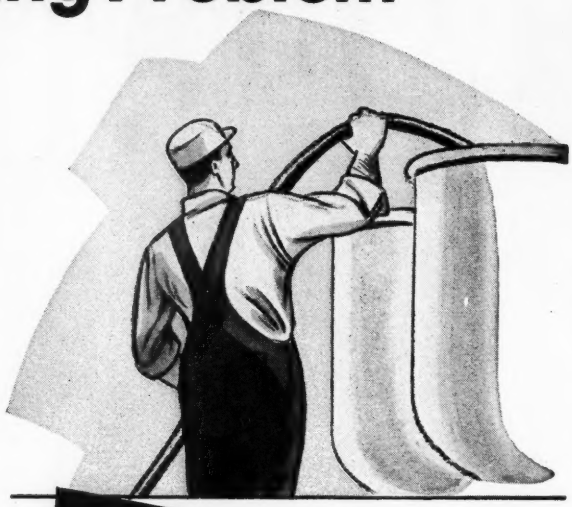
to a Purchasing Problem—

ORTAC hose that answers most of your needs!

THERE'S a simple answer to hose purchasing problems—Goodyear's ORTAC (*O*il *R*esistant *T*ube *a*nd *C*over). For this ONE construction was designed by the G.T.M.—Goodyear Technical Man—to handle MANY jobs.

ORTAC will withstand gasoline, fuel oils and distillates. It resists attack from solvents. Contaminants found in water don't harm it. ORTAC is excellent too for air and spray service. Its cover resists sun, weather and wear—and ORTAC has a tube that won't flake, swell or discolor.

Ask your nearest distributor for the full story of ORTAC—or write Goodyear, Akron 16, Ohio.



GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GTM - Specified ORTAC HOSE
for UNIVERSAL USE
A
B
C
A Synthetic tube resists gasoline, oils, distillates, solvents
B Braids of high-strength rayon cord
C Cover resists weather, oil, sun, abrasion

LOOK FOR YOUR GOODYEAR INDUSTRIAL RUBBER PRODUCTS DISTRIBUTOR *in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods." He handles Hose, Flat Belts, V-Belts, Molded Goods, Packing, Tank Lining, Rubber-Covered Rolls built to the world's highest standard of quality.*

GOODYEAR

THE GREATEST NAME IN RUBBER

Ortac—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

This Week in Metalworking

STEEL

Vol. 130 No. 24 June 16, 1952

✓NEWS ✓PRODUCTION-ENGINEERING ✓MARKETS

SPECIAL REPORT: A 32-page Guide for Selecting Tool Steels and Carbides, opposite page 106

✓**Metalworking Outlook** 59
Capsulized forecasts of things to come . . . Straws in the wind . . . What industry is doing

As the Editor Views the News 63

Windows of Washington 74
Reflections from the nation's capital . . . What the 82nd Congress is doing . . . Impacts of government on industry

Mirrors of Motordom 81

The Business Trend 85

Men of Industry 89

✓**Production-Engineering News at a Glance** 95

Production Reaming: Fine Finishes Faster 96
Present equipment and standard tools may produce finer finish if proper techniques, tools are used

Ultrasonics—Inspection Applications Grow 99
Better understanding of how sound behaves in various materials broadens area of utilization

Progress in Steelmaking 142
Blast Furnace Practice—Part XI(c). Beneficiation of Air: Effect of raw material composition and blowing rate

Motorized Line Speeds Manifold Assembly 149

New Products and Equipment 181

✓**The Market Outlook** 195
Metal Prices and Composites start on Page 196

The Metal Market 207

Behind the Scenes	6	Obituaries	92
Letters to the Editors	12	Calendar of Meetings	176
Subcontract Summary	72	Helpful Literature	191
Checklist on Controls	73	Here, There in Industry	217

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Finish with Diamond
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ABRASIVES DIVISION, DEPT. C

ELGIN NATIONAL WATCH CO.

ELGIN, ILLINOIS

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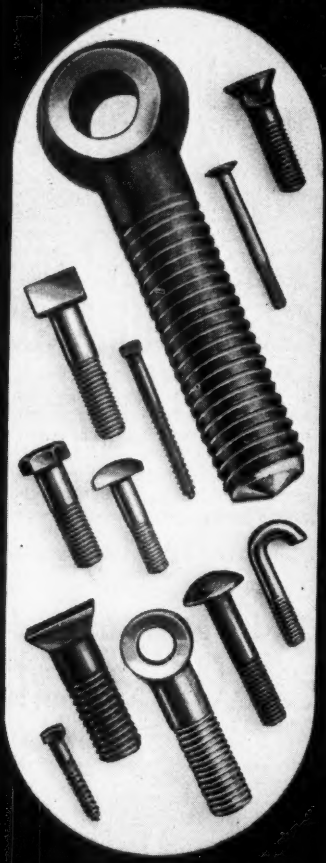
EYE BOLTS

by an exclusive method



Among Pawtucket's many specialty products, these lower-cost eye bolts or "swing" bolts are the leaders in this field. Pawtucket's exclusive production method keeps cost low, dimensional accuracy unusually high and strength above standard.

Pawtucket eye bolts are made in standard sizes ¼" and larger, or to your specifications. In any size, you can depend on a uniform Class 3 fit.

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"THE BOLT MAN"

MANUFACTURING COMPANY

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THE PLACE TO SOLVE YOUR BOLT PROBLEMS

T.M. REG.

Behind the Scenes . . .

The Guide

This is it—the issue of STEEL which, to the east of here, carries the 32-page "Guide for Users of Tool and Die Steels." We're proud of it because we know it can help you.

This week's cover, of course, pertains to the guide. The photo was taken by Frank Reed of United Press' Acme Special Services Department. Thanks to co-operation of George W. Stamm, manager, and R. C. Kuhn, assistant manager, Cleveland branch of Crucible Steel Co. of America, the photograph of tool steels (cut to size) was taken in the warehouse. Nicholas Stanton of the Crucible sales department had the whole thing set up. Seen in the photograph are Crucible Salesman James Heath and Warehouse Manager Frank Speck.

Happy Birthday to Us

Geraldine, a cleaning woman in the building and our night editor, tapped us on the shoulder the other evening to remind us that our 17th birthday was rapidly drawing to a close. For Shrdlu first burst into print—in little 6-point type—on June 10, 1935.

In a fit of nostalgia, we checked back through our old columns. We can only say that in the past 17 years we have grown a lot. We now come out in 8-point type.

Bow Ties

You'll be delighted to learn that this week is National Bow Tie Week. We own two bow ties but never wear them because we have such a struggle tying the things.

But we'll try again because we're always anxious to oblige.

The Game Has Changed

We went on a picnic with some of the STEEL editors. Attending were Bob Jaynes, Floyd Lawrence, Bill Wolfe, Art Zimmerman, Bob Huber, Nancy Shaffer and John Kelsey.

We got involved in a pick-up softball game. Our observations on the sport are:

It's just about twice as far from home plate to first base as it was when we were in school.

Balls in use today are a bit out-of-round. Their behavior on the way to the plate is quite irregular and deceiving. Also they have a strong tendency to take bad hops when we're playing the infield.

The outfield, which used to be the spot for sissies and hitters, is now the hardest of all to play. Long distance running is required. This running is usually in such a direction as to make a throw to the infield out of the question.

We eventually lost track of the runs scored and just had a good time. Everyone was stiff—the next day.

Lakefaring Bible

Off the press is one of the more important but less frequently issued of the Penton publications.

The *Great Lakes Red Book* has been for years the Bible of lakefaring men. It's a directory of more than 1500 vessels plying the Great Lakes. The 1952 edition puts in the palm of your hand (the book measures 3 1/16 by 4¾ inches) a list of the owners, captains and engineers of those ships and gives all other data of importance to the Lakes marine trade.

Although we can get violently seasick in a rowboat on Lake Erie, we still enjoy the romance of the Lakes via the *Red Book*, revelling in ship names like the *General Orlando M. Poe*, *David Z. Norton*, *Samuel F. B. Morse* and *Hilda* (a barge, poor girl).

For your $1 copy write Book Department, Penton Publishing Co., Penton Bldg., Cleveland 13, O.

Puzzle Corner

The chicken in the June 2 problem weighed 8 pounds. First in with that answer were Robert W. Huff of Canton, O., George W. Frederick of Republic Steel Corp. and A. Richard Marcus of General Materials Co.

O. W. Hildebrand of St. Louis Steel Products Co. submits this one: What is the total length of a three-sectioned flag pole if the first section is 9 feet long, the third section as long as the first section plus half the second section, and the second section is as long as both the first and third sections?

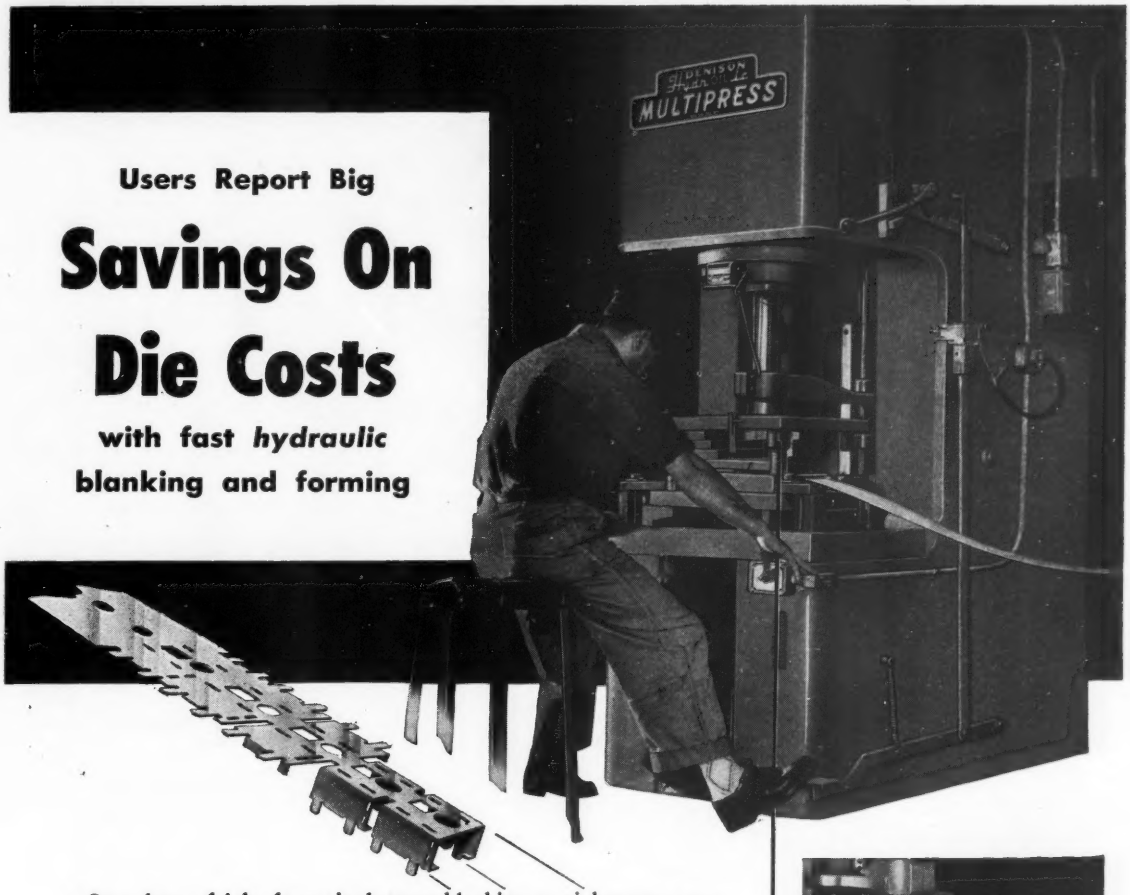
Shrdlu

(Metalworking Outlook—Page 59)

Users Report Big

Savings On Die Costs

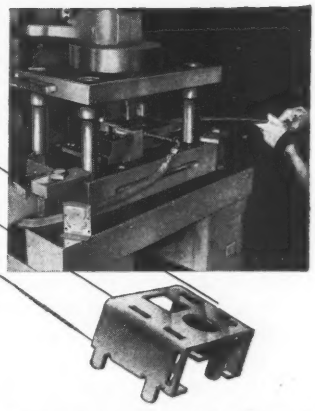
with fast *hydraulic* blanking and forming



On a host of jobs from single-stage blanking to eight-stage compound and progressive blanking and forming operations, the Modern Venetian Blind Co. adds *lower die costs* to other production gains — with the smooth, oil-hydraulic action of Multipress.

This adjustability and control of stroke length, ram speed and pressure assure further advantages. Tooling is easier to set up and change. Blanking dies get minimum wear for two reasons (a) Die impact is reduced greatly and (b) Pressure limits can be set only slightly above the force needed to shear the metal. This allows closer control of re-grinding and permits more grinds per die — slashing costs where they often pile up fastest. The 35-ton Multipress on this job is set for automatic cycling, to permit continuous manual feeding of pre-finished strip stock. Automatic stock feeds could also be used.

If you're looking for better, safer, high-speed ways to blank, form, pierce, draw, flare, broach, trim, bend, stake, swage, rivet, stamp, mark or press-fit, you'll want full details on Multipress. Eight frame sizes. One-ton to fifty-ton capacities. Manual or automatic controls. Ram actions to suit any need. Write today.



Typical part blanked and formed on progressive dies by Multipress, from .030 gauge pre-painted strip metal, at Modern Venetian Blind Co., New Bedford, Mass.

The DENISON Engineering Co. 1163 Dublin Road, Columbus 16, Ohio

DENISON HydrOILics — MULTIPRESS®

"I wonder what happened to me !", said Alice

ALICE in Wonderland ate the magic cake and grew until she was more than nine feet tall. Our National bureaucracy also seems to have partaken of the magic cake of power. Bureaus in our government have grown in number and scope until their activities now control, to a great extent, the lives of all individual Americans. Department after department adds more and more people -- state, justice, commerce, treasury--not to mention those sprawling emergency born agencies of price control, N.P.A. and other alphabetical subdivisions.

The number of employees of our federal, state and local governments continues to grow. During many recent months, personnel was added to the federal payroll at the rate of 1,500 daily.

What is the reason for this mushrooming? The Korean War? Threat of war in Europe, Southeast Asia, or the Middle East? Obviously not! A glance at the federal budget gives the answer. The estimated cost of all governmental functions for the fiscal year 1952 is in excess of 70 billions of dollars, an increase of 26 billions, or approximately 60% more than last year.

When will it end? Only you, the individual citizen, who carries the bureaucratic load on his back, can stop it. It will end when enough patriotic men and women demand from congress that the Washington Wonderland start shrinking back to reasonable proportions.

YOUR SCRAP IS NEEDED — YOUNGSTOWN

The Youngstown Sheet and Tube Company

General Offices--Youngstown 1, Ohio
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MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.

Ford

boosts machine output 4 times

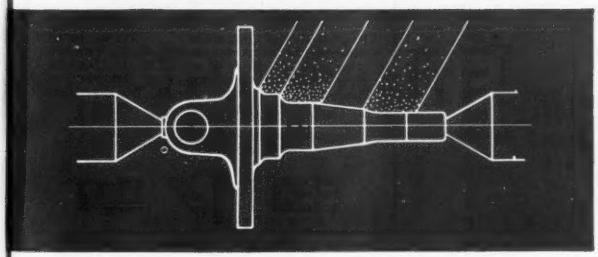
Grinding Operations Combined by Grinding 3 Diameters and 3 Blending Radii in One Operation

- **Less machine investment**
- **Production costs reduced**

Seven LANDIS TOOL 14" x 18" Type CH Plain Grinders with new overhead profile wheel dresser and wheel base set at 30°. These machines in FORD Mound Road Plant have released manpower for more vital jobs.

work data

Name of Part—Front Wheel Spindle
Pieces per Hour—90
Machine—Type CH Plain Grinder with Angle Wheel Base
Stock Removal—.015" on diameter
.009" on faces
Limits—.0005" on diameter
.010" on radius
Material—Steel Forging



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LANDIS TOOL COMPANY WAYNESBORO, PENNA., U. S. A.

HERE'S A FIRE EXTINGUISHER YOU CAN RECHARGE AT ANY AIR PUMP!

An ordinary air pump will prime this new Kidde dry chemical extinguisher with more fire-killing power than any other unit its size!

See how easy it is to recharge! Just unscrew the head, put in five pounds of dry chemical, screw the head back on and it's ready to charge from any plant or service station air pump.

And see how easy it is to operate! One hand swings this portable extinguisher into action. One finger squeezes the trigger. Poof! A cloudlike pattern of dry chemical smothers the fire while you remain safely behind a curtain of heat-absorbent powder.

This revolutionary new Kidde extinguisher is so safe, so sure, you'll find it a necessity for trucks, garages, factories—wherever there is a danger of small fires.

Write today for full information.

1 ***CHARGES AT ANY AIR PUMP.*** **Operates at 150 lbs. pressure.**

2 ***COVERS GREATER AREA*** **with Kidde's cloud-like discharge pattern.**

3 ***PRESSURE GAUGE*** **in pistol-grip handle tells you when air is needed.**

4 ***TRIGGER ACTION*** **gives you finger-tip control.**

5 ***POWDER WON'T PACK.*** **Perfect for trucks, garages, factories, etc.**

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NEW 36-inch BROACH SHARPENER for small surface broaches

FEATURES

- Saves floor space: only 84" long, over all.
- TOUCH CONTROL enables operator to remove a minimum of stock . . . prolongs life of the tool.
- Two hand wheels, one to move the table and the other to elevate the grinding head assembly.
- New type (fabric) dust guards for table way.
- Dynamically balanced motorized grinding spindle, mounted on ball bearings on swivel head slide.
- Exceptionally easy moving table and slide, because they roll on ball bearings, mounted between hardened and ground steel ways.
- Vertical slide is of rigid construction, with heavy, adjustable ways.
- Heavy cast iron base for rigidity.
- Also built in 3 other sizes: 60", 72" and 80" capacity between centers.

Write for information on Broach Sharpeners.
Ask for Bulletin BS-3.

50 YEARS IN BROACHING! We're the oldest in the world!
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We design and build a complete line of standard and special broaching machines, tools and fixtures.

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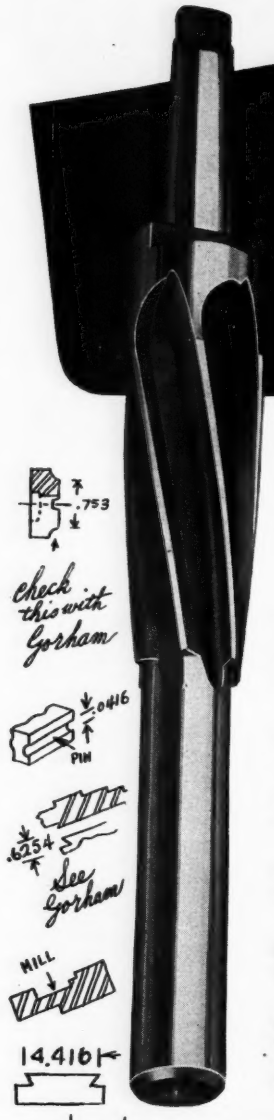
THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

Turn problems into *profits*



with GORHAM-Engineered Special Cutting Tools

For fast, practical solutions to tough tooling problems, call in the expert . . . your nearby Gorham Field Engineer! He provides a complete engineering service to determine your exact tooling requirements. For instance:

•

He starts with your product, sketch or idea.

•

He surveys your production operations and your available equipment.

•

He considers work material properties and desired finishes and tolerances.

•

He plots proper machine feed, speed and method of tool driving.

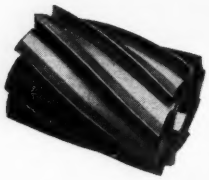
•

then . . . he develops practical design and engineering specifications for a special cutting tool, metallurgically "tailor-made" for your application.

•

. . . *and* his recommendations are backed by Gorham's unmatched facilities! These include three fully-equipped manufacturing plants, large Engineering and Metallurgical staffs, and the finest heat treating equipment.

These resources, plus Gorham's more than thirty years' reputation for producing the finest cutting tools, are dedicated to furnishing prompt and profitable solutions to your special tooling problems. Gorham-engineered "specials" are turning problems into profits in thousands of plants every day . . . why not let them do the same for *you?*



If you haven't met your nearby Gorham field Engineer, write for his name, or send details of your problem direct for recommendations.

Gorham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

14401 WOODROW WILSON • DETROIT 3, MICHIGAN

LETTERS
TO THE EDITORS

It's YOUR Fight, Too

Read with great interest your editorial "It's Your Fight Too". (May 26, p. 43) and agree with you wholeheartedly that it is not just a contest betwen big steel on one side and big labor and big government on the other. It is actually a battle which each and every individual ought to take part in to see that the interests of all our people are fully protected.

Charles F. Dark
executive vice president
Palmer Mfg. Corp.
Phoenix, Ariz.

You not only said one but several mouthfuls in your May 26 editorial entitled "It's Your Fight Too."

My only suggestion is that you spread editorials like this either on the front cover or on two pages in big type and then some.

Horace A. Laney
Buffalo

. . . "It's Your Fight Too" is not only good, but very timely. I would like to congratulate you and your associates on your efforts to keep us thinking on and about things that concern us all in this critical period.

Roy C. Hobson
National Malleable & Steel Castings Co.
Cleveland

Two More for the Record

We noticed with interest your article "Method Recovers Lithium" (May 19, p. 94) on the new Lithium Sulphate recovery process.

We would like to point out for the record that there are two additional producers of Lithium to those mentioned in the story: Foote Mineral Co. and American Potash & Chemical Corp.

R. D. Drake
Foote Mineral Co.
Philadelphia

"Best We've Seen"

Your description of the Babcock & Wilcox hot extrusion plant (June 2, p. 92) is one of the best we have seen on the Ugine-Sejournet process. The sketches and photographs contribute immensely to an understanding of the process. May we have tear sheets?

H. B. Emerick
Jones & Laughlin Steel Corp.
Pittsburgh

• *Certainly.*

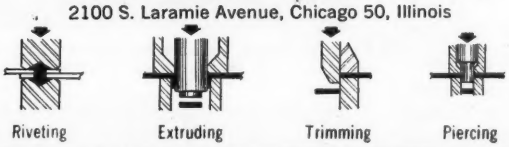
5 TONS
at your fingertips

REDUCE HEAVY PLATE HANDLING EQUIRED FOR PUNCHING OPERATIONS!

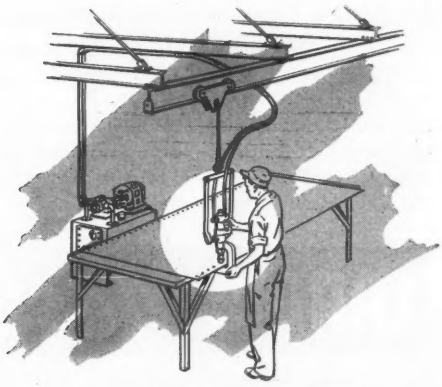
With the new Danly Portable Hydraulic Piercing Unit, awkward and costly shifting and positioning of heavy plates in fixed equipment is eliminated. This small compact unit can be installed anywhere in the shop . . . the power cylinder itself will deliver up to 12½ tons of piercing pressure at 5000 psi.

And you save with light plate or sheet too because the new Danly Portable Piercing Unit features built-in hydraulic stripping action. The work is held firmly as the punch is withdrawn . . . and there are no springs or rubber cushions to wear out. Write today for complete information.

DANLY MACHINE SPECIALTIES, INC.
2100 S. Laramie Avenue, Chicago 50, Illinois



Weight only 45 pounds . . . designed for application in metalworking shops of all kinds for general duty piercing with a minimum of work handling!



Typical installation of Danly Portable Hydraulic Piercing Equipment

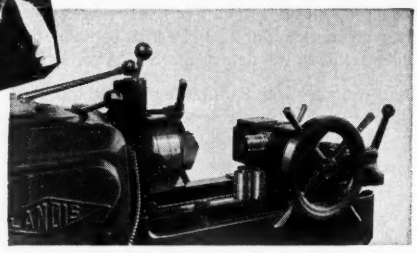
DANLY®

Hydraulic Metalworking Equipment
Standard or Special

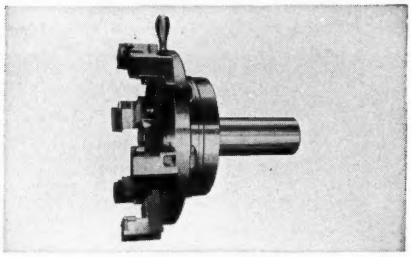
Mechanical Presses . . . 50 to 3000 Tons

A COMPLETE Thread Engineering SERVICE

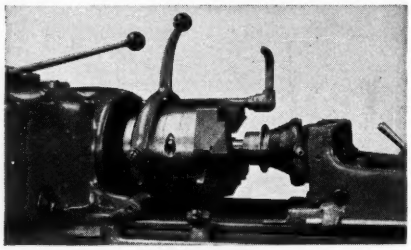
- Product Design
- Process Development
- All Types of Threading Equipment
- Special Applications



A 1½" Single LANDMACO Machine equipped with special work holding fixture for threading adapter sleeves.



A Special Die Head (LANDMATIC 40AXX) designed and built to thread valve seat rings up to diameters of 14¾".



A 1½" Single LANDMACO Machine equipped with special carriage front for threading axle housings.

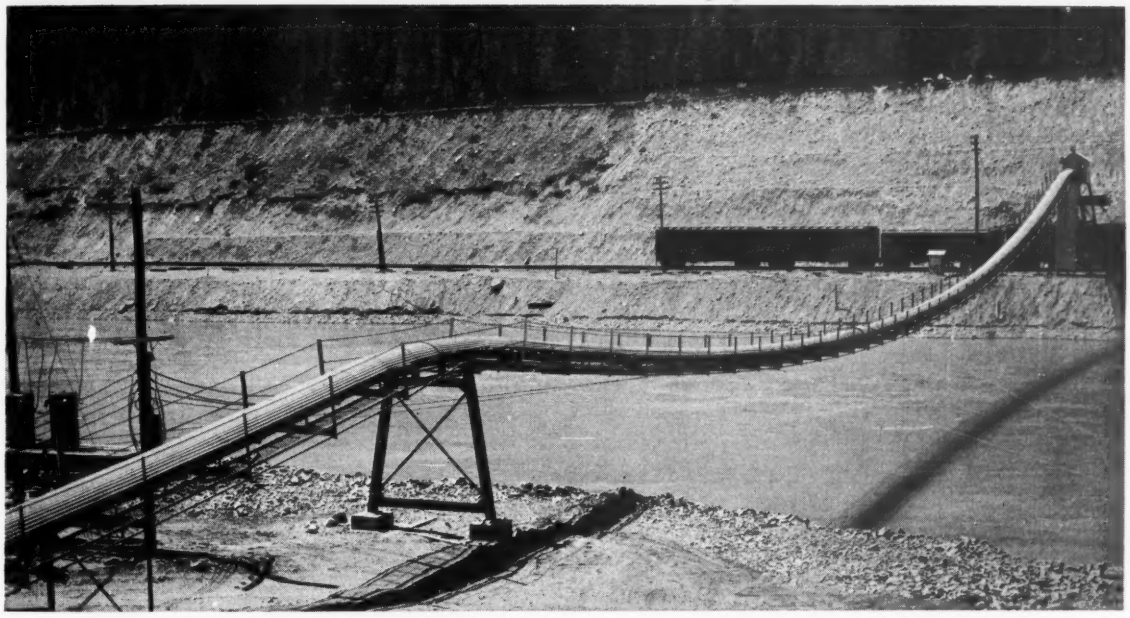
New and improved products often create unprecedented threading problems—both in design and production. Realizing this, we offer all manufacturers the help of our Thread Engineering Service in efficiently and economically solving their Thread Problems.

The difficulty may be in designing a thread which will function properly as an operating part, or in producing a thread already designed. Whatever the problem our Engineering Department is ready to help with advice and assistance—or to undertake the solution alone.

After examining all phases of the problem, the necessary recommendations will be made on basic Thread Design, the production process, and the Threading Equipment that should be used. For example, often a difficult Thread Production problem can be solved with a slight change in basic Thread Design. Occasionally, a job is so unique that special equipment is needed —three such Special Equipment Applications developed by our Engineering Department are illustrated.

Whatever your Thread Problem, use our THREAD ENGINEERING SERVICE. Hundreds of manufacturers have been able to perform difficult threading operations efficiently and economically with Landis Threading Equipment. The years of Thread Experience and Engineering Know-How that has brought LANDIS to the fore in Thread Generating is at your service. May we help you?

LANDIS *Machine* COMPANY · WAYNESBORO PENNSYLVANIA



Here's how to move ore across a river, 100 tons per hour, eliminating a four-mile truck haul. This Link-Belt belt conveyor, 700 ft. long, is mounted on a non-rigid suspension bridge. Vertical gravity-type take-ups keep belt at proper tension.

Why LINK-BELT belt conveyors are first choice in so many industries . . .

Engineering experience plus quality components combine to cut handling costs

EFFICIENCY in moving materials makes the difference between profit and loss in many operations. That's why it's so important to make sure you get the *right* belt conveyor system for your needs.

And there's no surer way of meeting your specific operating requirements than by calling in Link-Belt. Our belt conveyor specialists can efficiently engineer the system and recommend the correct components from Link-Belt's complete line of idlers, trippers and terminal machinery. And Link-Belt can match your needs in associated equipment—other types of conveyors, feeders, elevators, car dumpers and shakers.

Equally important, with such a tremendous background in belt conveyor application, Link-Belt is in an ideal position to follow through on every detail of your job—from planning through erection, if desired. One source—one responsibility.

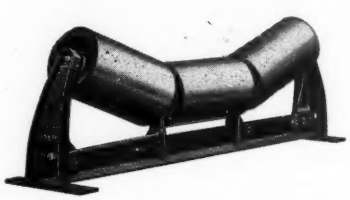
Link-Belt will gladly work with your engineers or consultants. There's a Link-Belt office in the principal city near you.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, Duluth 2, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities. 12,720-A

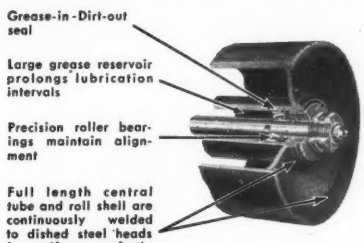
LINK-BELT

BELT CONVEYOR EQUIPMENT

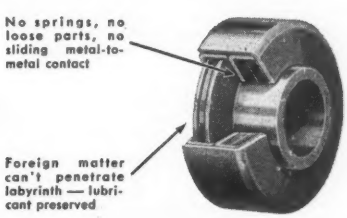
LINK-BELT Roller Bearing Idlers provide free-rolling, long life



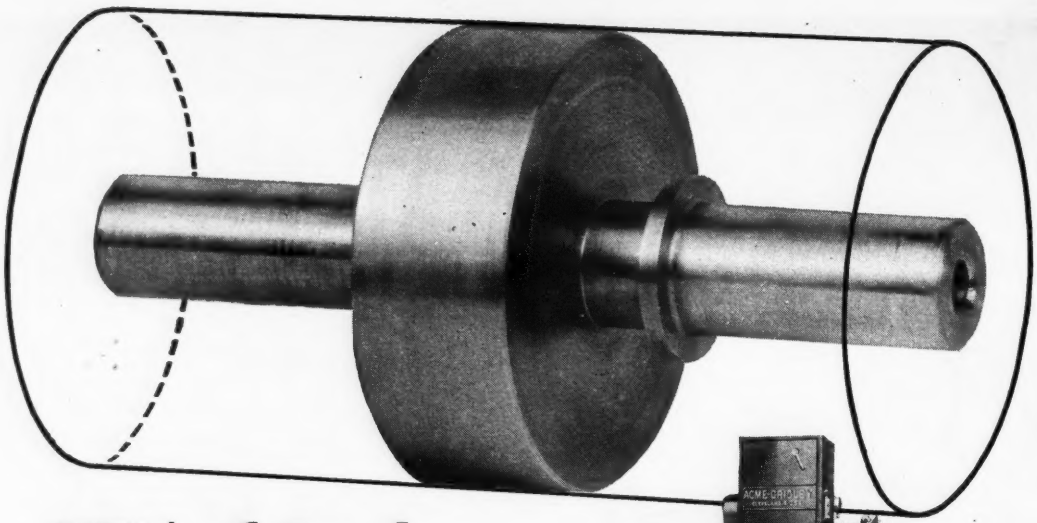
Standard for Industry—L-B "100" Idler


Grease-in-Dirt-out seal
Large grease reservoir prolongs lubrication intervals
Precision roller bearings maintain alignment
Full length central tube and roll shell are continuously welded to dished steel heads for uniform, perfectly balanced strength

Less lubrication and adjustment


No springs, no loose parts, no sliding metal-to-metal contact
Foreign matter can't penetrate labyrinth — lubricant preserved

Grease-In-Dirt-out Seal

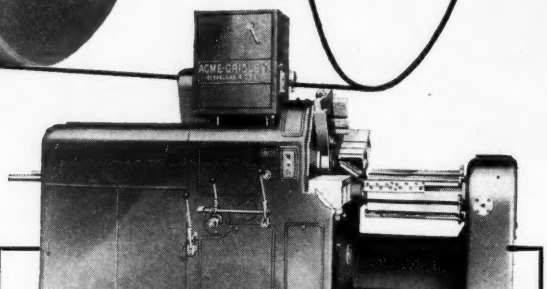


77% of Stock Hogged Off...

by heavy forming and turning on the new

ACME-GRIDLEY MODEL M

Single Spindle Bar Automatic



Almost 28 pounds of metal removed in fifteen minutes — that's the kind of punishment this Model M takes in stride. And it almost doubles the production of the turret lathe on which the job was formerly done.

Here's customer-demonstrated proof that rugged construction plus ingenuity in design pay off in more production and lower machining costs. Check these exclusive design features:

- **Three automatic spindle speed ranges provide the correct surface speeds for different diameters of work and for top efficiency of carbide and high speed tools in the same set-up.**
- **Independent operation of 8 toolslides provides selection of proper feeds for each cut, while turret indexing without interrupting side cuts permits overlapping operations to gain production time.**
- **Easily accessible camming cuts changeover time; wide, open tooling zone speeds adjustments and chip removal.**

May we furnish quotations showing how the Model M can cut your machining costs? Catalog M-50-A

JOB FACTS

PART — Spur Gear
SIZE — 4¼" x 9"
MATERIAL — 4140 C.D.S. Annealed Bar Stock
MACHINE — Acme-Gridley 5½" Model M Single Spindle Automatic
BAR OPERATIONS — 14
TOOLS — Carbide and High Speed Steel
STOCK REMOVED — 98.222 cu. in.
MACHINE TIME — 15 min.
FORMER TIME — 29 min. (Turret Lathe)

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

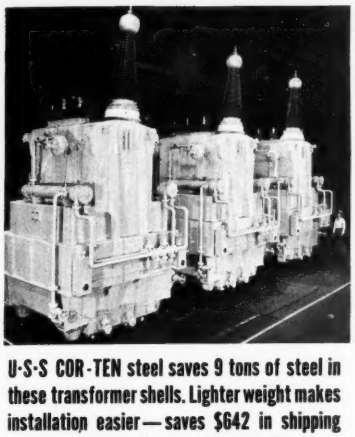
Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

Facts you should know about U·S·S HIGH STRENGTH STEELS

You can reduce weight without reducing durability

with U·S·S COR-TEN High Strength Steel

—its superior corrosion resistance is the reason why



U·S·S COR-TEN steel saves 9 tons of steel in these transformer shells. Lighter weight makes installation easier—saves $642 in shipping costs—steel supply goes 33% further.

By using ⅜" U·S·S COR-TEN steel plates in place of ½" mild steel in the shells of three 29,000 kva, 230,000 volt transformers, the Pennsylvania Transformer Company, Canonsburg, Pa., reduced weight per unit from 24,000 lbs. to 18,000 lbs. This 3-ton weight saving not only conserves steel, and makes the transformers easier to install, but cuts the costs of shipping to their destination in Oregon, $214 per unit.

Here's what Pennsylvania Transformer has to say about this application. "With the trend to larger generating stations, the ability of the utilities to handle the physical size and weight of transformers has been of growing concern. Weight of the finished transformer is therefore important.

"The corrosion question is always pertinent. If the generating plant is hydro, you may have water spray to contend with. If it is steam generated by coal, you have an atmospheric problem. Corrosion-resistant steel, therefore, is desirable.

"By substituting U·S·S COR-TEN steel on these new transformers we obtained both weight reduction and corrosion resistance. In our opinion, COR-TEN steel has far more resistance to atmospheric corrosion than copper bearing steel, and with it our engineers were able to reduce weight to such a degree that the extra cost for COR-TEN steel was more than offset by (1) less tons used, and (2) freight reduction on the finished product.

"Our shop people tell us it is a bit more difficult to bend in the brake press but, once formed, U·S·S COR-TEN steel stays in position better than mild steel, making it easier for our fitters to put the transformer tanks together."

ANY steel used to reduce weight needs more than high strength alone. To meet the test of time, it must have high resistance to corrosion as well. Superior ability to fight corrosion is the important property that sets U·S·S COR-TEN steel apart from most other high strength steels.

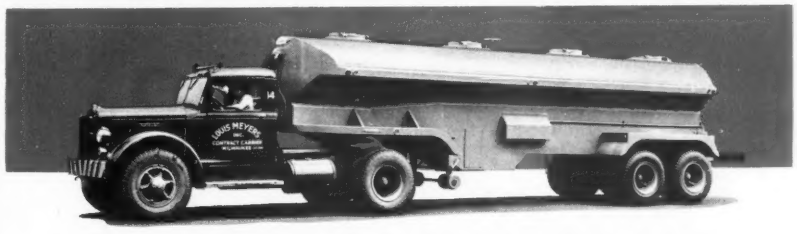
For not only does this pioneer low-alloy, high-strength steel have a yield point nearly twice that of structural carbon steel, but in addition, COR-TEN steel's *resistance to atmospheric corrosion is from 4 to 6 times greater.*

As a result, U·S·S COR-TEN steel can be safely used in thinner sections to substantially reduce weight, and because its strength is strongly protected against corrosive attack, this lighter construction will last just as long and will require no more maintenance than the heavier construction it replaces.

For the past 17 years, designers have used U·S·S COR-TEN high strength steel to lift the costly drag of deadweight from every kind of mobile equipment—from freight cars and streamlined trains, from buses, trucks and trailers. Even shop pallets, tote boxes, refrigerators, filing cabinets and baby walkers have been built lighter and longer lasting with U·S·S COR-TEN steel. Every pound of weight saved in this equipment has meant fewer pounds of metal to buy—fewer pounds to move—and fewer pounds to ship. That makes for SAVINGS, all along the line.

• • •

If you want to reduce weight safely, with least change in shop methods, and at low cost, send us your designs and we'll show you where and how to use U·S·S COR-TEN steel to best advantage.



Built 1,150 lbs. lighter with U·S·S COR-TEN steel this bulk cementer carries 3 barrels free on every trip

● Weight reduction pays off in this modern 120-bbl. capacity cement hauling unit. The more than one-half ton of weight saved by COR-TEN steel construction is replaced by three barrels of payload that ride cost free, which saves the carrier $1.26 on every 100-mile round-trip the unit makes. It totals up to a tidy sum as the years roll by.

Built by the Trailmobile Co., Cincinnati, Ohio, the hopper body has V-type quick discharging bottom. U·S·S COR-TEN steel, used one to two gages lighter than would be necessary with carbon steel, reduces the weight from 13,970 lbs. to 12,820 lbs.

U·S·S COR-TEN steel construction does more than save weight and reduce delivery costs. It gives this Trailmobile carrier body 4 to 6 times higher resistance to atmospheric corrosion than plain steel. It insures superior resistance to wear and abrasion—materially increases ability to withstand road shock and vibration.

Since its introduction seventeen years ago, U·S·S COR-TEN steel has been used by 27 leading builders of trucks and trailers—names famous in the commercial car industry—to make their equipment lighter, more durable, able to carry more payload, and cheaper to operate and maintain.

UNITED STATES STEEL COMPANY, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

"We've really learned

says Bill Ednie

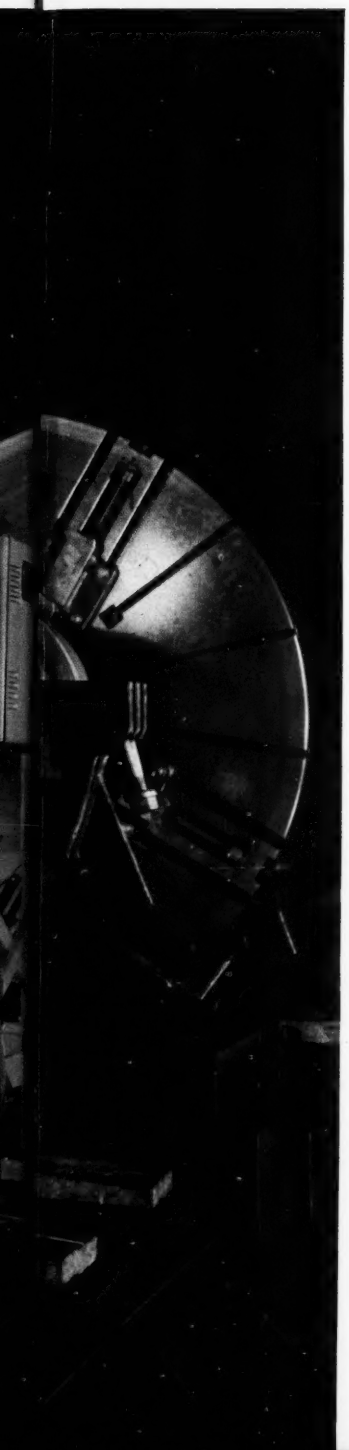
h

U.

UNITED STATES STEEL

how to control quality"

U. S. STEEL INSPECTOR



● You'd want to meet Inspector Bill Ednie if you visited our Homestead District Works Forge Department. He has been an inspector now for 13 years. His father was a U.S. Steel Inspector at Homestead, too—back in the days when you tested forgings with a light bulb and a ball peen hammer.

Now, of course, Bill has the advantage of amazingly accurate test equipment, but he still has to be right on his toes to analyze the complex inspection data. In other words, he is the man who actually "signs out" the forging, and makes sure that it meets every specification.

If you had talked to Bill Ednie when we took these photographs, the conversation might have gone like this:

YOU: *"How much does this forging weigh?"*

EDNIE: "86,000 pounds. It's a steam turbine generator shaft."

YOU: *"Is this the first inspection made on it?"*

EDNIE: "No. This is one of the last. Right after it was forged, we 'barked' it—put it in a lathe and took enough metal off to get a smooth surface. Then I made the first sonic test and found the piece was free of thermal ruptures and internal voids."

YOU: *"How does this sonic tester operate?"*

EDNIE: "Well, it sends a pulse of energy through the forging and it bounces back from the other side. The trick is analyzing the trace on the oscilloscope to be sure the piece is sound all the way through. We use this test for quality control during manufacture."

YOU: *"Do you make other tests?"*

EDNIE: "Always. After we finish the first machining operation, we go in with a trepanning tool and get test bars. Then we send the bars to the lab for tensile and Charpy impact tests and micro tests to check grain structure and cleanliness of the metal."

YOU: *"How about the center of the piece?"*

EDNIE: "We usually bore and ream a hole all the way through, then give the entire inside a boroscope examination. This way, you can actually *see* that the center of the forging is sound."

YOU: *"Does that about wind it up?"*

EDNIE: "For this generator shaft, yes. But inspection often gets more complicated on other forgings. Take a steam turbine rotor. After we bark it, it goes into the heat treating furnace for over 200 hours. Then it's tensile tested, bored, final rough machined and stress relieved. And after that, it gets the heat-indication or stability test."

YOU: *"What's that?"*

EDNIE: "It's a test to show how the rotor will behave in actual use. We put the rotor in a combination lathe-furnace—it's a furnace built on a lathe. The rotor is revolved for about 100 hours at the temperature it will encounter in actual service. If it passes this test, it won't change shape after it's installed."

YOU: *"How do you know what tests to make?"*

EDNIE: "That depends on the end use of the forging. Sales, Technical, Operating and Production men all work with the customer to determine what tests are needed for any one job.

"Sometimes we make scleroscope tests—that's a way to check hardness without marking the piece. Other times we run Magnaflux tests. All in all, we have the most modern testing equipment available."

YOU: *"How do you figure that all this inspection pays off for the customer?"*

EDNIE: "I think the biggest thing is that—because of better inspection—we've been able to develop better production methods. This naturally means fewer rejects, so our customers get better delivery.

"We've really learned how to control quality, and that's what the customer wants. This shop has been going for a long time, and every one of the gang has found that satisfied customers mean more work for all of us."

• • •

When you buy Quality Forgings from United States Steel, men like Bill Ednie work on them. We'll stack their work up against the finest in the land, and we're confident in our ability to furnish the highest quality forgings made. Please send your inquiries to United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.

USS *Quality* FORGINGS

heavy machinery parts—carbon, alloy, stainless

electrical and water wheel shafts

hammer bases and columns

marine forgings

Facts you should know about U·S·S CARILLOY STEELS

U·S·S metallurgists can help you turn out quality products with lean alloy steels

● Thousands of manufacturers have lately been forced into using lean alloy steels, instead of the rich alloys they are accustomed to. Some have found that the transition from rich to lean alloy has presented a few problems. However, satisfactory results *can* be obtained from lean alloy steels, if heat-treating and fabricating methods are adjusted to suit these steels.

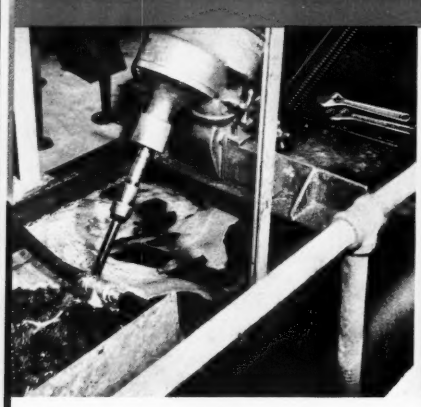
If you are having trouble perhaps we can help you. We'll be glad to analyze your heat-treating and fabricating methods and give you specific advice based on our wide experience in this field.

There is no charge for this service. It's part of our continuing program to help all of our customers get the most out of the steels they're using.

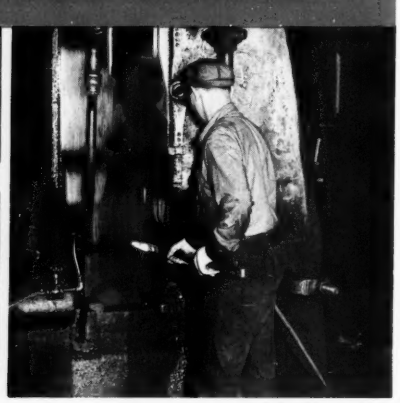
We quote two well-known manufacturers who have benefited from our suggestions:

"Results with lean alloys equal to those with high alloys"

—UTICA DROP FORGE & TOOL CORPORATION



"... with improved quenching ... we obtain more satisfactory hardening."



"Forging is easier with lean alloys."

● Utica Drop Forge & Tool Corporation developed an improved method of quenching and tempering with the help of U·S·S metallurgical assistance. Mr. C. E. Wilderman, Vice President of the Tool Division, has this to say: "With your help, our metallurgists have developed heat-treating methods that enable us to get results with lean alloys equal to those obtainable with high alloys. Daily control tests show that our adjustable-end wrenches surpass the Federal Specifications by several times (for the 12-inch wrench—25,000 in. lbs. of torque as compared to 7,650 in. lbs. required). We know a good deal of the credit for these high torque ratings is due to the improved heat treatment."

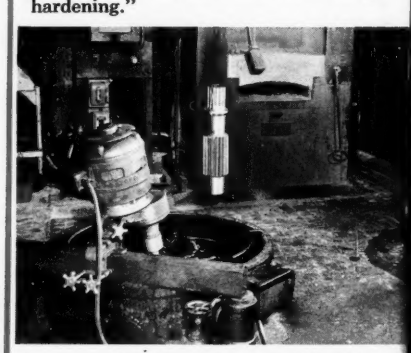
"Improved quenching.. Increased production..."

—JEFFREY MANUFACTURING COMPANY

● Mr. C. S. Thomas, Chief Metallurgist at Jeffrey Manufacturing Company, says, "We used to have trouble with uneven hardening.

"Now, with an improved quenching process recommended by U·S·S engineers, we get uniform hardness without exception. The new method speeds up quenching and makes it easier to quench large parts, such as 100-pound, alloy steel gears.

"We gain increased production and reduce the chance for human error. In addition, we obtain more satisfactory hardening."



An improved method of quenching, recommended by U·S·S metallurgists, is used at Utica Drop Forge & Tool Corp.

Our engineers and metallurgists will bring to the solution of your problems the latest ideas and techniques in the working and treating of steel. We urge you to draw freely on their services. Just call your nearest District Sales Office, or write to United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.

UNITED STATES STEEL COMPANY, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

UNITED STATES STEEL

Facts you should know about

U·S·S CARILLOY STEELS

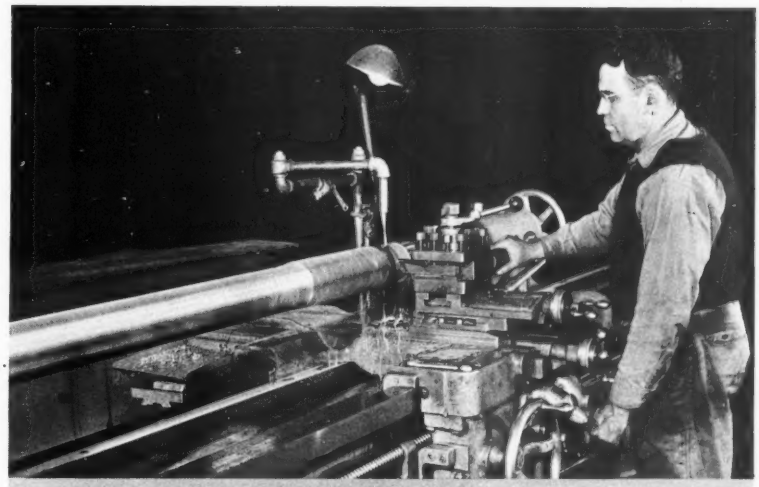
Heavy-duty axles and shafts made without heat treating—with pre-hardened free-cutting CARILLOY FC

● Every year, over 5 million tons of coal pour out of the 6 Fairmont, West Virginia region mines of Consolidation Coal Company (W. Va.). All repair and rebuilding of the hard-working equipment used in these mines are done at the company's Monongah, W. Va., maintenance shop.

Here, highly skilled machinists make everything from mine locomotive axles to armature shafts. Each new part they make must be as strong as the original, without benefit of heat treatment after machining.

So here is just the place for a very special kind of alloy steel.

Consolidation Coal Company (W.Va.) has found that they can produce practically all of the heavily stressed parts they use in their own shops—without heat treating—with a special grade of alloy steel, such as U·S·S CARILLOY FC steel. This pre-hardened, free-cutting alloy steel is received from the mill already quenched and tempered to the hardness required. No further heat treatment is necessary. Finished parts have a minimum tensile strength of 140,000 psi. and good surface finish.



HERE, in the Monongah, W. Va., maintenance shop of Consolidation Coal Company (W. Va.), a machinist turns a CARILLOY FC axle for a 20-ton locomotive.

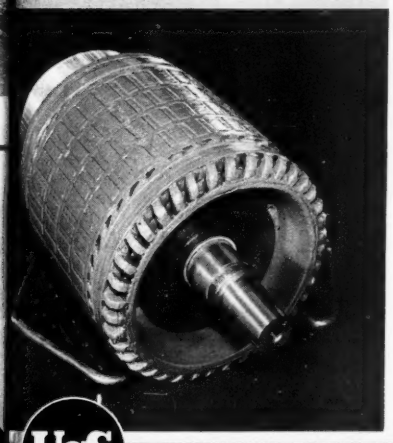
U·S·S CARILLOY FC offers you important advantages if you have to make heavy-duty shafting or other parts that require 125,000 to 175,000 psi. steel. This deep-hardening manganese, chromium, molybdenum alloy steel is available quenched and tempered from 255 to 375 Brinell. You don't have the expense of heat treating after machining and you eliminate rejects caused by distortion and scaling.

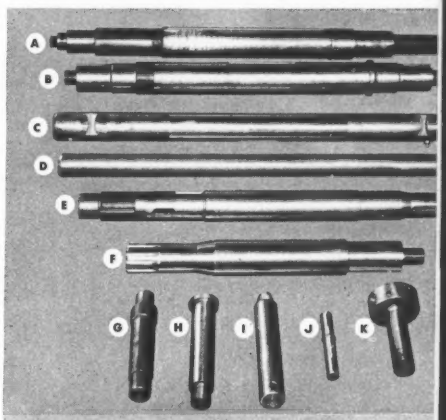
For *production* work, remember that CARILLOY FC, easy to machine, is easy on your tools—some users report that tools last 300% longer, and more pieces can be produced per hour.

CARILLOY FC is available now, quenched and tempered *or* annealed, in all standard bar forms and sizes.

It costs only a fraction of a cent more per pound than ordinary through-hardening alloy steels.

The shaft for this 1800 pound locomotive armature was machined from CARILLOY FC.





CARILLOY FC is used in machining this great variety of parts. Notice the diversity of applications handled by one grade of alloy steel: (A) is an armature shaft. The following parts are for loading machine: (B) loading clutch shaft, (C) conveyor take-up shaft, (D) conveyor hinge pin, (E) transmission clutch shaft, (F) caterpillar drive axle, (G) caterpillar idler axle, (H) sprocket shaft, (I) caterpillar take-up shaft, (J) hydraulic pump shaft, (K) caterpillar take-up screw.

USS

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UNITED STATES STEEL

Facts you should know about U·S·S STAINLESS STEEL

U·S·S 17 (Type 430) finding wide acceptance

both as an alternate grade and for new Stainless applications

THE ready availability of straight-chromium Stainless Steels has led designers to take a closer look at these materials. As a result, they are discovering hitherto unexplored and highly-desirable qualities both in fabrication and performance.

For example, the lower tensile strength of the straight-chromium grades enables them to be drawn, bent or sheared with less power than comparable nickel-bearing grades. Spinning is easy and welding presents no unusual difficulties.

These qualities have led designers to specify the straight-chromium grades, including U·S·S 17 (Type 430) Stainless Steel, not only as alternates for currently unavailable nickel-bearing grades but also in applications where Stainless Steel has not been used previously.

Since straight-chromium Stainless Steel has been available without CMP tickets in recent months, these designers have investigated it for applications where even carbon steel has been used before. And they have found the superior corrosion resistance, the attractive appearance and the ease of cleaning of U·S·S 17 far more than offset its additional cost.

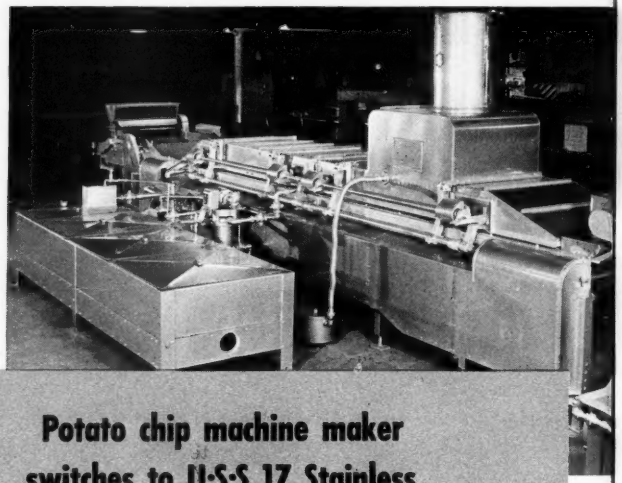
As an alternate for nickel-bearing grades, U·S·S 17 Stainless has taken its place on the production line of many products. Many manufacturers report no problems encountered in the switch; in some instances shop employees had to be told they were using a different grade.

Whether you are considering U·S·S 17 as an alternate grade or for a first use of Stainless, our engineers will be glad to assist and advise you in its application.

Icing depositor now manufactured from U·S·S 17 Stainless Steel

Mallet & Company, Pittsburgh, Pa., manufacturer of equipment for the baking industry, turned to U·S·S 17 Stainless for their icing depositor. This grade fulfills every requirement of sanitation, appearance, ease of cleaning and durability.

Fabrication of the outer shell, drawer, fixtures, top, hopper, drive cover, shaft and agitator from U·S·S 17 involved no problems. Steps involved include bending, roll forming and welding.



Potato chip machine maker switches to U·S·S 17 Stainless

Restrictions on nickel-bearing grades of Stainless Steel led J. D. Ferry Co., Inc., Harrisburg, Pa., to examine U·S·S 17 for suitability in manufacture of its potato chip machines. As a result, supply tank covers, side panels, salter, chip chute, vapor vent stack and washing machine cover of the machine are fabricated from this straight-chromium grade.

Fabrication, including brake forming of ⅜" Stainless plate, riveting, stamping, roll forming and welding, caused no difficulty. The appearance and ease of cleaning of U·S·S 17 meet the company's rigid specifications.

U·S·S STAINLESS STEEL SHEETS · STRIP · PLATES
BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

UNITED STATES STEEL COMPANY, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
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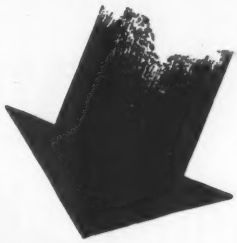
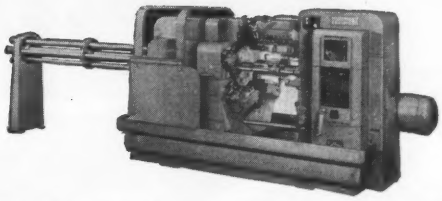
UNITED STATES STEEL

One answer to the manpower shortage



THE WARNER & SWASEY 5-SPINDLE AUTOMATIC

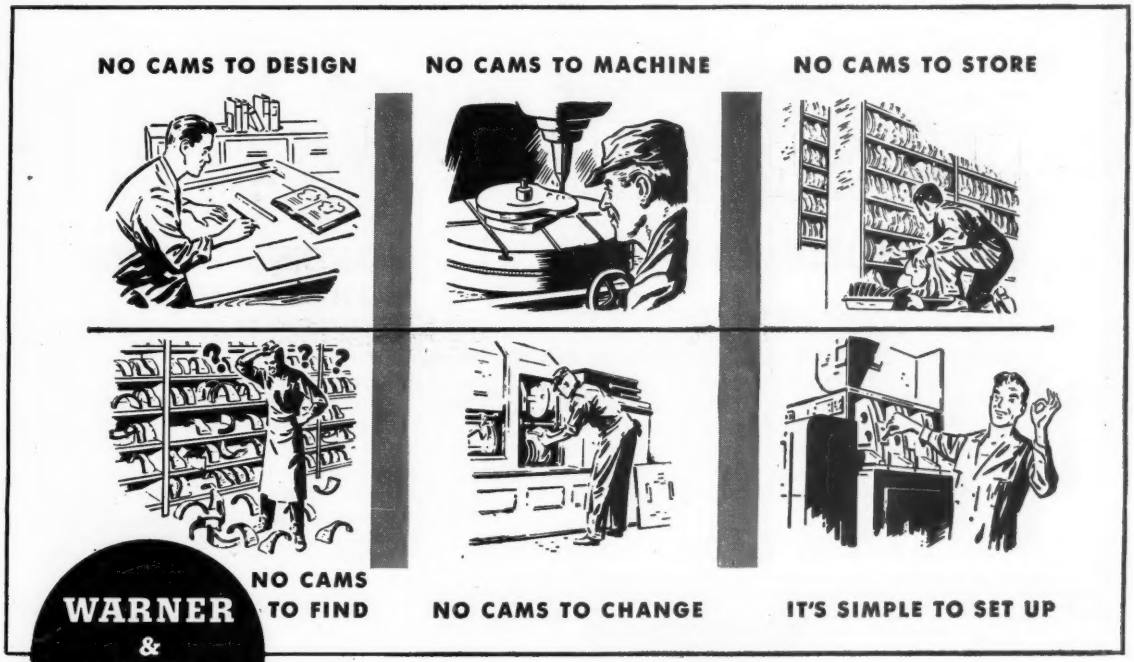


THIS NEW automatic machine, with its advanced *camless* design, helps answer one of the biggest problems facing industrial management today—the problem of increasing production in the face of today's tight manpower market.

In many cases, one 5-Spindle Automatic is out-producing five or six manually operated machines—and one man can operate two of these automatics!

And setup is simple and quick—averaging 4 or 5 hours for a completely new setup—making these machines ideal for short and medium lot runs.

Think of the savings in time and cost from this one feature alone... NO CAMS TO CHANGE.



WARNER & SWASEY *Cleveland*

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS, AND TAPPING MACHINES

How many of you use

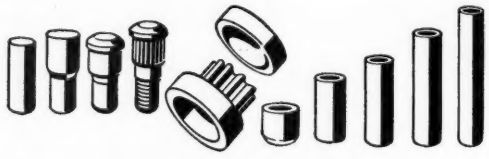
Here is a list of the most important Parker Products used in the metal working industry today. It's an expanding list, growing as Parker research develops new products to broaden the field of metal treatment.

Some of these products add durability and protect appearance by anchoring the paint and controlling corrosion. Another enhances performance and prolongs the life of wearing surfaces. Others bring important benefits to production lines, making new techniques practical, improving conventional operations.

Every Parker Product listed here has proved itself. Each one is formulated and manufactured to the high Parker standard of quality to work for you with highest efficiency, dependability and economy.

☐ BONDERITE

The standard surface preparation method for metals to produce paint finishes of highest quality. Bonderite converts the surface to a nonmetallic phosphate coating, integral with the metal, which is an excellent anchor for paint and an effective corrosion resistant. An adaptable product, simply applied in spray or immersion equipment, easily controlled for dependable results. Used widely, on the world's most famous and admired manufactured products.

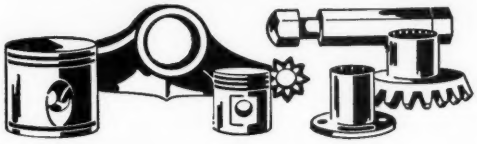


☐ BONDERITE AND BONDERLUBES

Cold forming of metals is faster, easier, and more economical of time and metal because of this proven combination. Bonderite and Bonderlube combine to form a lubrication system that makes metals flow smoothly, lengthens die life, cuts metal loss. Years of experience are behind this Parker development—90% of all seamless steel tubing (and millions of feet of welded steel tube) is drawn with Bonderite. Many Ordnance items are now being manufactured with this aid.

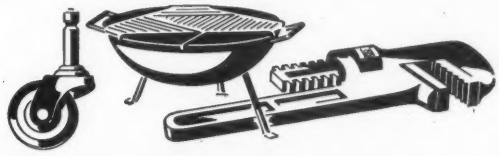
**Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*

these **PARKER PRODUCTS** do to make your metal products better?



☐ PARCO LUBRITE

On gears, cylinder walls, pistons, rings, shafts, valves and rods, Parco Lubrite is used to create a nonmetallic phosphate coating on the metal. This coating holds lubrication under pressure, prevents metal-to-metal contact and resulting scuffing and scoring during initial operation. The smooth, easy break-in with Parco Lubrite makes for longer subsequent service life.

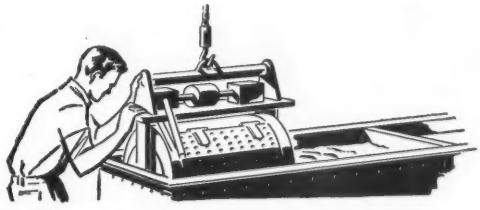


☐ PARCO COMPOUND

For 35 years, this Parker product has meant quality rust resistance for iron and steel. The dense crystalline phosphate coating becomes integral with the metal and forms an excellent base for rust preventive oil or paint finishes. Any iron or steel article, small or large, simple or complex, may be treated with Parco Compound.

☐ PARCOLACS

A useful group of specialized products made up of various finishes for use after Parco Compound. Includes wax base finishes, stains, and rust preventive oils suitable for dip, spray or centrifuge application. Available for quick or slow drying requirements. Parcolacs add desirable appearance and performance qualities to articles treated.



☐ PARCO CLEANERS

An outstanding line of metal cleaners formulated to condition the metal for the next step in finishing, as well as to remove grease and soil efficiently. Alkali, acid, and emulsion types, each formulated to meet certain conditions of soil, production requirements, and finishing operations which follow.

PARKER PRODUCTS MEET GOVERNMENT SPECIFICATIONS

Parker RUST PROOF COMPANY, DETROIT 11, MICH.

Mail this coupon today!

Please send me information on products checked:

- ☐ Bonderite
- ☐ Bonderite and Bonderlube
- ☐ Parco Lubrite
- ☐ Parco Compound
- ☐ Parcolacs
- ☐ Parco Cleaners

PARKER RUST PROOF COMPANY
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Whatever your needs for heavy steel forgings in industry, Midvale can assure you of the finest in craftsmanship, precision and ultimate performance. Whether it is weldless gear rings for turbine speed reduction . . . cylinders for hydraulic presses . . . weldless high-pressure vessels for oil refining, gas reactions and steam generation or hardened and ground steel rolls for cold rolling carbon and alloy steel, stainless steel, aluminum, copper, brass, zinc, foil, paper, linoleum, plastics and rubber . . . Midvale engineers can help you design them. Midvale craftsmen, with the most modern equipment, will build them to your most exacting specifications. Put your heavy forging problems in our hands.

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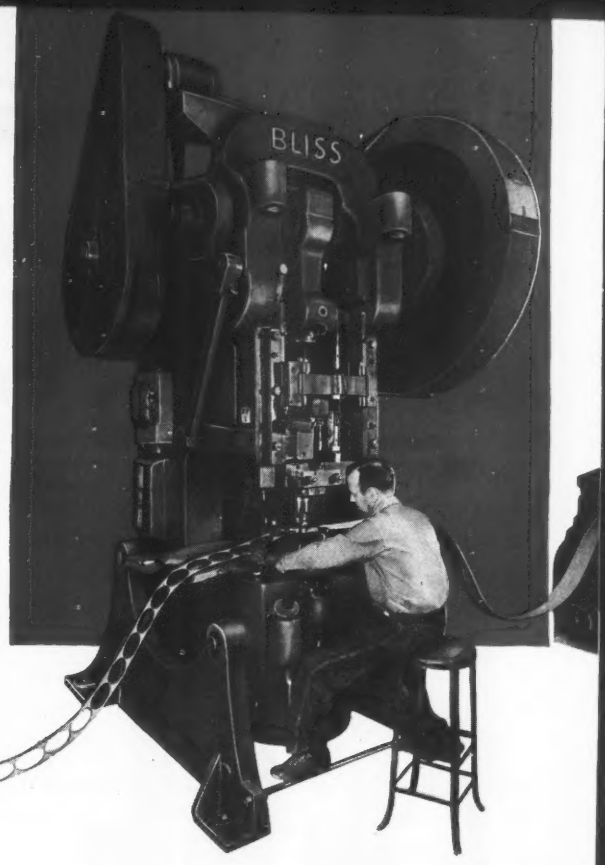
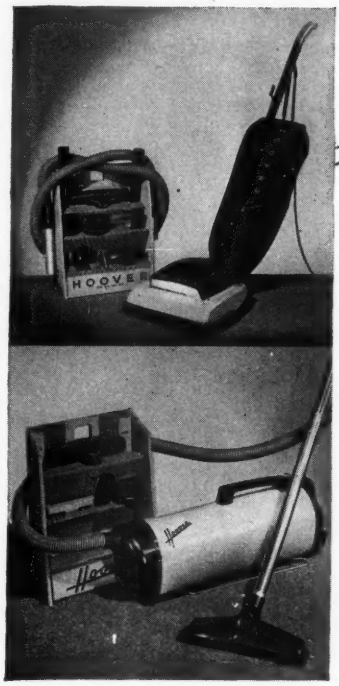
PRODUCERS OF FORGINGS, ROLLS, RINGS, CORROSION AND HEAT RESISTING CASTINGS

Bliss...

The Presses That Outsell All Others Dominate Hoover's Press Room, Too...





Punch presses must be versatile to produce the range of metal stampings needed for Hoover Company's famous upright and tank-type vacuum cleaners. They must be rugged, too, to withstand the hard usage demanded by heavy production schedules. That's why Bliss Inclinables dominate Hoover's press room...represent 90% of the stamping equipment at the North Canton, Ohio, plant. As Hoover's press room superintendent puts it, "Even the oldest of our Bliss presses works perfectly; maintenance for all twenty-six is negligible."

More than 50,000 Bliss Inclinable Presses are now serving industry. And despite heavy demands for these presses, Bliss' expanded facilities make it possible to provide early deliveries of certain sizes. Your local Bliss sales engineer can give you full information.

E. W. BLISS COMPANY, CANTON, OHIO

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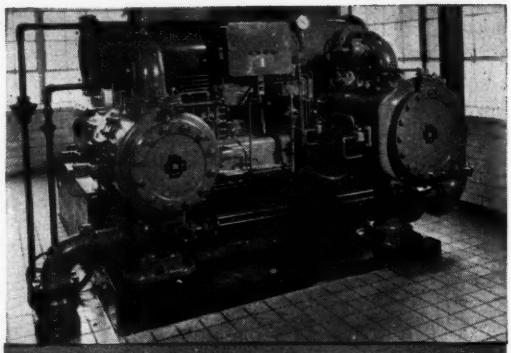
EARLY DELIVERY OF CERTAIN SIZES

From a single press for a given job... to a complete press room...

It's Bliss

USERS

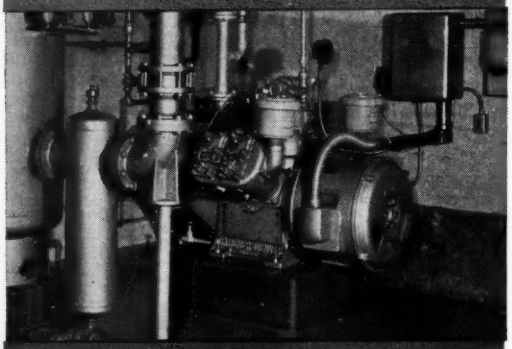
Master mechanic of a Pennsylvania processor tells of five years' experience with their HA. No service trouble whatsoever. In his opinion, the HA is "the best compressor made."



The Gardner-Denver HA Horizontal Two-Stage Air Compressor

TELL

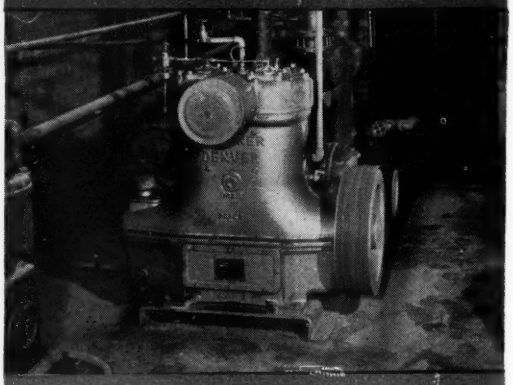
A Kansas City manufacturer has had a WB carrying his full air load almost 24 hours a day for several years. No overhaul required. Has replaced only a few small parts.



The Gardner-Denver WB Vertical Two-Stage Air Compressor

WHY

A manufacturer in Michigan reports he purchased an AA Compressor along with his present building. It's been supplying air for his operations for four years now, and hasn't been touched yet.



The Gardner-Denver AA Vertical Single-Stage Air Compressor

GARDNER-DENVER AIR COMPRESSORS

ARE SO OFTEN SELECTED FOR CONTINUOUS HEAVY-DUTY SERVICE IN MILL OR FACTORY. WRITE FOR DETAILS.

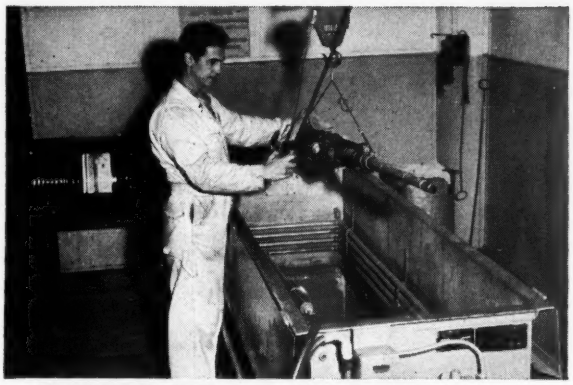
SINCE 1859 **GARDNER-DENVER**

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

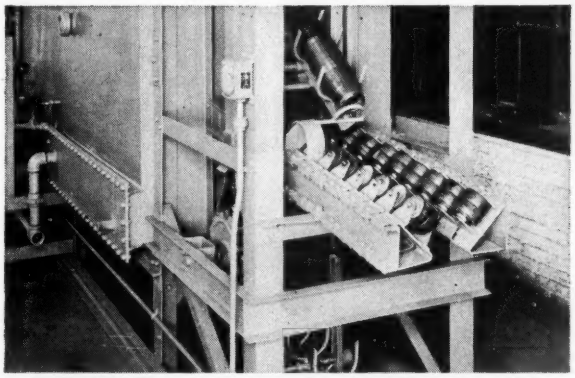
THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

VAPOR DEGREASING *with* "TRICLENE" D
(TRICHLORETHYLENE)

cleans ordnance equipment in less than a minute!



AIRCRAFT ORDNANCE is prepared for installation by the removal of grease-like storage preservatives in a manual degreaser. "Triclene" D vapors reach into deep recesses of intricate parts . . . quickly remove oil, grease and cutting compounds. One man can easily operate simple degreasing equipment.



ARTILLERY SHELLS emerge from conveyorized degreasing unit at assembly line speed. Fast, thorough cleaning action of "Triclene" D permits use of conveyor systems for high production rates. Equipment is low in initial cost . . . efficiently reuses solvent for maximum economy. (Navy Photo)

WHERE SPEED IS ESSENTIAL in metal cleaning, as in the ordnance field, vapor degreasing with "Triclene" D Trichlorethylene meets top production demands. The heaviest oils and grease are removed from sections of all sizes, shapes and metals in a matter of seconds! Even the most intricate parts are thoroughly cleaned at the same speed in the same easily operated equipment. In all types of vapor degreasing equipment, "Triclene" D gives peak performance . . . uniform results. It quickly cleans the most difficult parts and leaves them warm and dry—instantly ready for further processing.

"TRICLENE" D is designed for vapor degreasing by the pioneers of the synthetic solvent field. In wide use for many years, "Triclene" D is fully backed by Du Pont research plus the practical advice and assistance of Du Pont technical representatives. Here are "Triclene" D's outstanding properties:

- Stable
- High purity
- Withstands moisture and heat
- Narrow boiling range
- Rated nonflammable

FOR MORE INFORMATION about vapor degreasing with "Triclene" D, send the coupon below to: E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington 98, Delaware.

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first in solvents for
VAPOR DEGREASING

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Electrochemicals Dept., Wilmington 98, Delaware

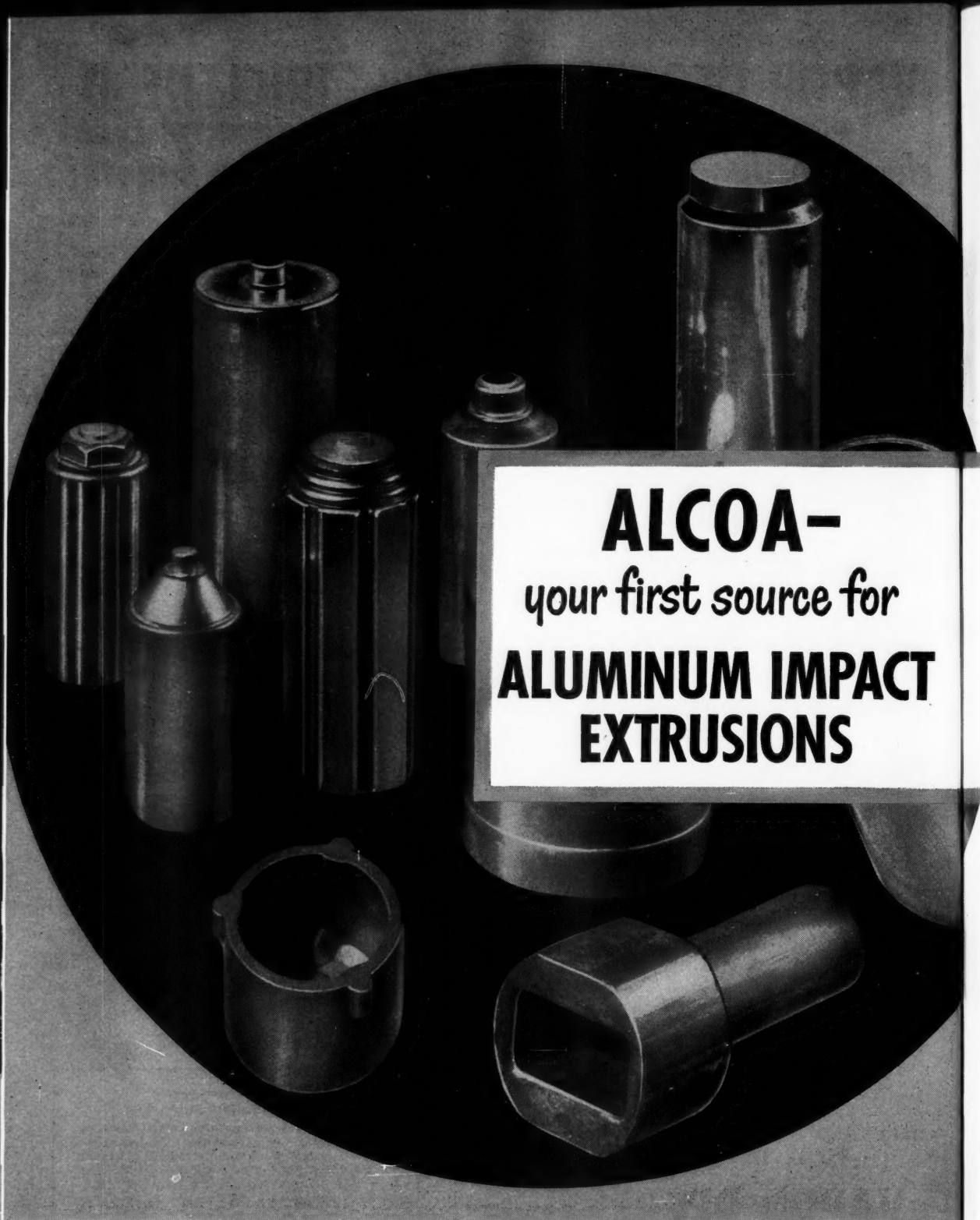
Please send me detailed information on Vapor Degreasing: applications, advantages, equipment used . . . and more facts on Du Pont "Triclene" D. We are interested in cleaning _____ products.

*Name*_____ *Position*_____

*Firm*_____

*Street & No.*_____

*City*_____ *State*_____



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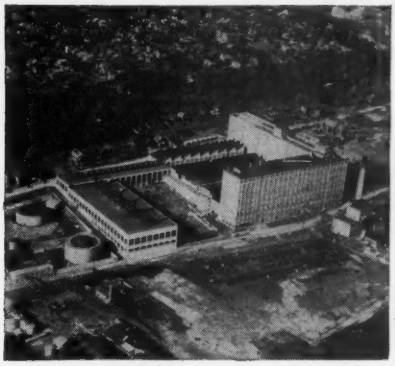
Facilities like these mean satisfaction with your source of supply—

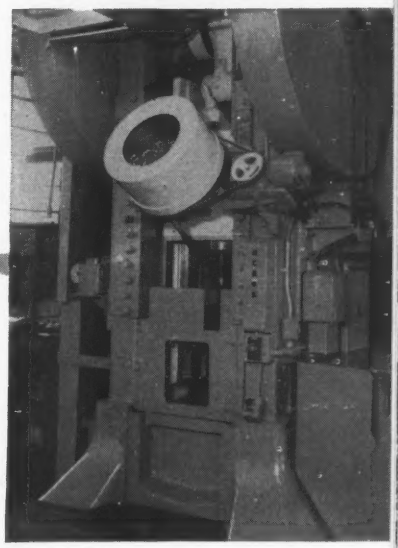
HIGH PRODUCTION from Alcoa facilities is typified by this battery of impact-extrusion presses equipped with automatic trimming units.



THE ALCOA PLANT, located at Edgewater, New Jersey, indicates the large impact-extruding capacity available at Alcoa. All the services of design consultation, estimating, production and secondary operations are performed here.

PRESSES OF ALL SIZES enable Alcoa to offer you facilities that permit free thinking in your engineering designs.

- Design help backed by technical literature, personal attention of Alcoa sales engineers and the facilities of the world's greatest aluminum research laboratories.
- 30 years' experience in making impact extrusions; 64 years' experience in working with aluminum.
- Ample capacity for large production runs and complete secondary operations such as flanging, flaring, beading and machining.

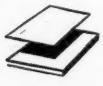


ALCOA'S NEW PRESSES not only extrude the desired section but trim it automatically as well.

Ask ALCOA first whatever you need in Aluminum

While the sale of our products is presently controlled by government regulations, you'll find no limitations on help in design, application or fabrication. Your local Alcoa sales office is headquarters for "everything" in aluminum. Alcoa sales engineers will co-operate to the fullest in helping you get the metal you need. Look for Alcoa under "Aluminum" in your classified phone book.

ALUMINUM COMPANY OF AMERICA
2162F Gulf Building • Pittsburgh 19, Pa.



SHEET, PLATE, FOIL

TUBE, PIPE AND PIPE FITTINGS

ELECTRICAL CONDUCTORS

CASTINGS AND FORGINGS

PAINT PIGMENTS, FLUXES AND LUBRICANTS

EXTRUSIONS AND ROLLED SHAPES

FASTENERS AND SCREW MACHINE SPECIALTIES

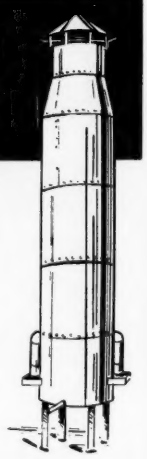
WIRE, ROD AND BAR

ALCOA *first in* ALUMINUM

ALCOA ALUMINUM ®

"Buffalo" *Tips on Getting the Best Service from your* **Fans**

REQUIREMENTS FOR AN EFFICIENT CUPOLA BLOWER



- Strength—light weight—compact design. Heavy steel plate housing, ribbed to stand the high pressures.
- Dynamically balanced rotors of heavy steel plate, riveted or welded—narrow construction to develop pressures efficiently.

"Buffalo" TYPE "CB"

PRESSURE BLOWER

—meets the requirements stated above for an efficient cupola blower. 150 cfm to 8000 cfm capacities, up to 2¼ lbs. pressure, single stage. Note compact direct drive design and overall rugged construction.

***Send For These Useful Facts on* PRESSURE BLOWING**

Bulletin 3553-A, lower right, contains performance ratings and construction data on "CB" and "CC" Blowers, with capacities up to 75,000 cfm at up to 4 lbs. pressure. Bulletin 3014-C describes "E" Blowers-Exhausters, in capacities up to 5500 cfm for pressures up to 55" of water. Write for your copies of these bulletins, at no obligation.

"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

158 MORTIMER ST. BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING

WEIRTON
STRIP STEEL

The better the strip, the better the product—and the easier production. Those are two important reasons why manufacturers find it advantageous to use Weirton cold-rolled strip steel. Its excellent drawing and forming qualities, its constant uniformity, promote plant efficiency and economy by reducing spoilage and tool expense. In short—Weirton strip boosts both quantity and quality.

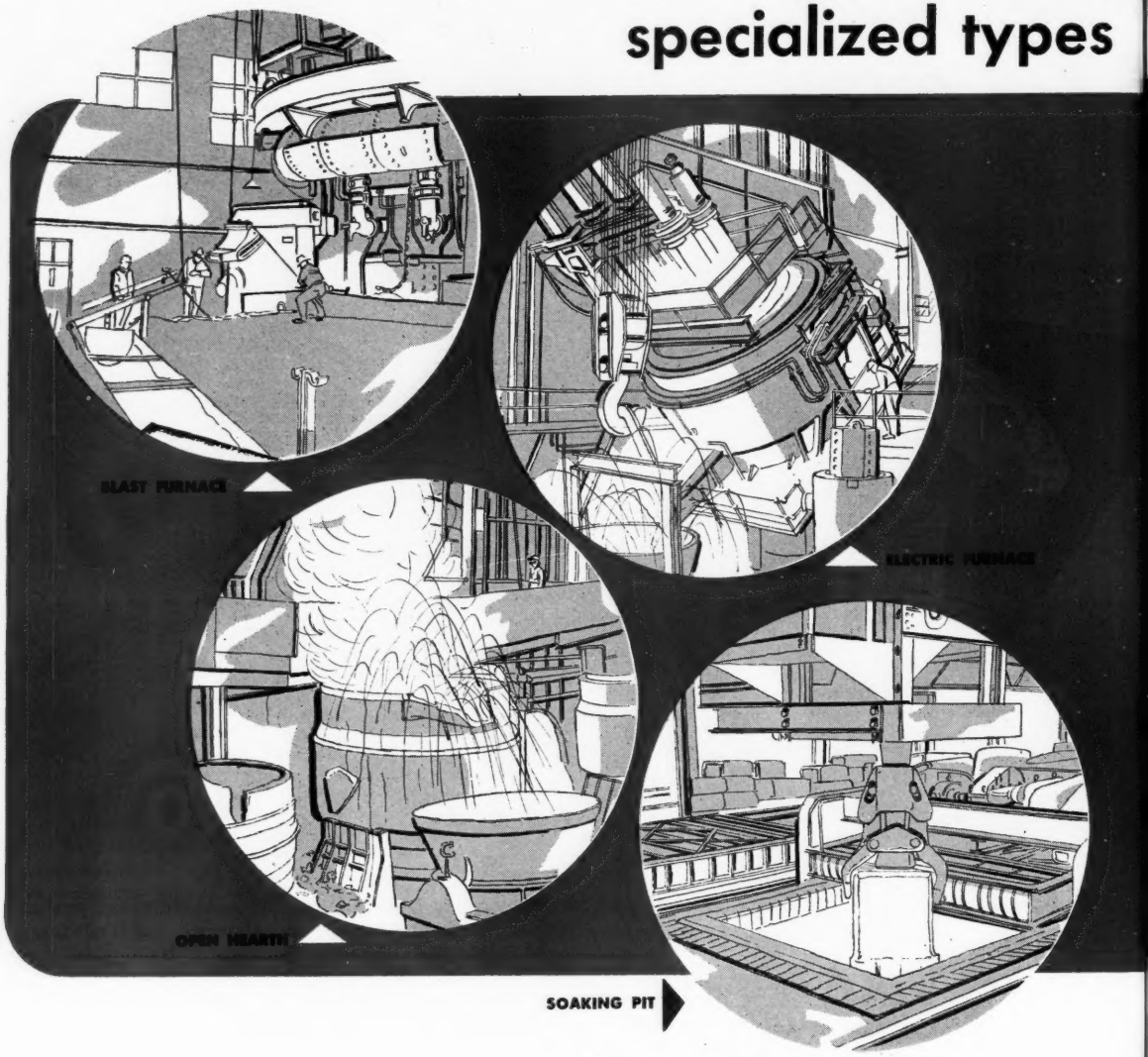
WEIRTON STEEL COMPANY
WEIRTON, WEST VIRGINIA

NATIONAL STEEL CORPORATION

Harbison-Steel Mill

specialized types

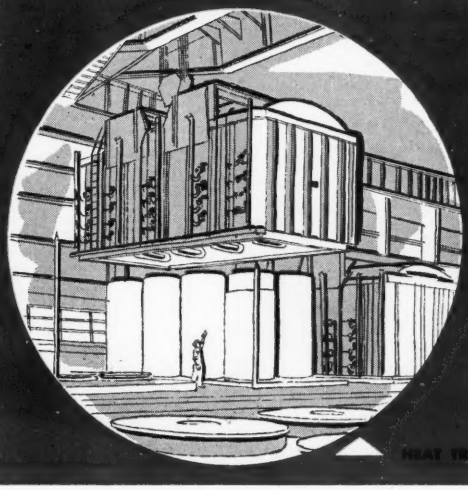
THE WORLD'S *Most Complete* REFRACTORIES SERVICE



Walker Refractories
for every requirement

Every heat of steel you pour, every ton you cast or roll, consumes a certain amount of refractories. The exact amount—which inevitably has a direct bearing on your cost of production—is determined by your selection of the refractories best suited to meet the specific requirement for each combination of operating conditions where heat is employed.

Harbison-Walker offers the most complete range of steel mill refractories comprising all classes of basic, high-alumina, silica, fireclay and insulating refractories, as well as plastic fire brick, castables, mortars and cements. Our Technical Service Department will be glad to assist you in selecting the types and brands of Harbison-Walker products that will give longest life in each application.



HEAT TREATING

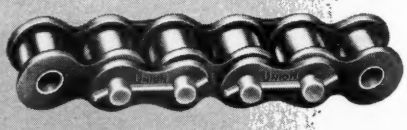
COKE OVEN

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
World's Largest Producer of Refractories
General Offices: Pittsburgh 22, Pa.

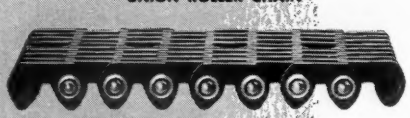
Union Chain's Performance Story PART · III

HOW UNION CHAIN RECOMMENDS

There is no need for Union Chain to recommend any steel chain but the right one—since Union Chain makes every type. Moreover, wide experience with every type of chain makes a recommendation from Union Chain's engineering staff a valuable one. Working out special chains for special cases is one of the important services offered by Union Chain, and you are invited to submit your unusual problems.

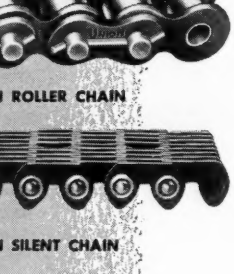


UNION ROLLER CHAIN



UNION SILENT CHAIN

UNION SILENT CHAIN FLEXIBLE COUPLING



UNION ROLLER CHAIN FLEXIBLE COUPLING

Part I - How UNION CHAIN *Specializes*

Union Chain manufactures nothing but steel sprocket chains, sprockets and attachments. Not only that—Union Chain is the only manufacturer producing every type of steel sprocket chain *exclusively*. Such specialization is the reason Union Chain consistently produces chains of the finest quality for every possible application.

Part II - How UNION CHAIN *Manufactures*

With nothing to make but chains—with nothing to be known for but chains—Union Chain insists on meticulous accuracy in the execution of both conventional and *extra exclusively Union* manufacturing operations, thus insuring superiority of performance.

Part IV - How UNION CHAIN *Distributes*

Direct Factory Representatives are located in most industrial cities to provide a two-way communication service between customer and factory. See list at right—as well as list of Stock Carrying Distributors.*

*At the present time there is a heavy demand for many types of chain. Consequently, our distributors are not always in a position to fill all orders from stock.

UNION HEAVY DUTY CHA

FINISHED STEEL ROLLER CHAIN • SILENT CHAIN • HEAVY DRIVE AND CONVEYING CHAIN •

UNION CHAIN REPRESENTATIVES

CALIFORNIA

American Chain & Gear Co.
C. A. Nicholas
5511 Pacific Blvd.
Huntington Park, California

Charles A. Fowler
889 Bryant Street
San Francisco 3, California

GEORGIA

H. F. Edge
208 Walton Bldg.
Atlanta, Georgia

ILLINOIS

Union Chain & Mfg. Co.
W. Albrecht
A. C. Mohr
B. Nelson
Room 1232
53 W. Jackson Blvd.
Chicago, Illinois

INDIANA

Paul W. Huddlestun
5745 Guilford Ave.
Indianapolis 20, Indiana

LOUISIANA

F. N. Johnston Co.
236 Humble Oil Bldg.
909 S. Jefferson Davis Pkwy.
New Orleans 15, Louisiana

MASSACHUSETTS

Transmission Engineering Co.
Stanley Johnson
6 Hartford St.
Newton Highlands 61, Mass.

MICHIGAN

Union Chain & Mfg. Co.
W. J. White
Basso Bldg.
7338 Woodward Ave.
Detroit 2, Michigan

MINNESOTA

F. N. Bathke
490 N. Snelling Ave.
St. Paul, Minnesota

MISSOURI

J. B. Flaherty
5473 Delmar Blvd., Rm 206
St. Louis, Missouri

Ed Schiefelbein
311 West 10th St.
Kansas City 6, Missouri

NEW YORK

John B. Foley
107 Tully St.
Syracuse, New York

Mays & Gleason, Inc.
50 Church St.
New York 7, New York

Potter & Dugan, Inc.
29 Wilkeson St.
Buffalo, New York

NORTH CAROLINA

M. R. Snyder Co.
304 E. Tremont Ave.
P. O. Box 3341
Charlotte 3, N. Carolina

OHIO

Fred W. Borrow
2925 Portsmouth Ave.
Cincinnati, Ohio

Union Chain & Mfg. Co.
F. H. Dalrymple
F. Smiley
Marshall Bldg.
Cleveland 13, Ohio

OREGON

J. W. Minder Chain & Gear Co.
307 S. E. Hawthorne Blvd.
Portland 14, Oregon

PENNSYLVANIA

David Davies
P. O. Box 4
Plymouth, Pennsylvania

Wayne Ritter
3031 V. Liberty Ave.
Pittsburgh 16, Pennsylvania

Union Chain & Mfg. Co.
John A. Shoemaker
Room 521
Schaff Bldg.
Philadelphia 2, Pennsylvania

TEXAS

Union Chain & Mfg. Co.
J. H. Castleberry
E. T. Teel
205 Irwin-Keasler Bldg.
Dallas 1, Texas

VIRGINIA

C. Arthur Weaver Co.
403 E. Franklin St.
Richmond 19, Virginia

WISCONSIN

Union Chain & Mfg. Co.
Room 508
Wisconsin Tower Bldg.
606 W. Wisconsin Ave.
Milwaukee 3, Wisconsin

SPECIAL Representatives

NEW YORK

Frank L. Allen, Inc.
50 Church Street
New York 7, New York

E. F. Cohan
500 Fifth Ave.
New York, New York

OREGON

W. D. Hollingworth
Room 400 Concord Bldg.
208 S. W. Stark St.
Portland 4, Oregon

UNION CHAIN STOCK CARRYING DISTRIBUTORS

ALABAMA

Alabama Bearing Company, Inc.
182 E. Jefferson St.
Montgomery, Alabama

Alabama Machinery & Supply Co.
Dothan, Alabama

Mill & Mine Supply Company
124 S. 20th Street
Birmingham, Alabama

ARKANSAS

Service Supply Company, Inc.
20 North University Street
P.O. Box 145, University Station
Fayetteville, Arkansas

CALIFORNIA

American Chain & Gear Co.
5511 Pacific Blvd.
Huntington Park, California

Charles A. Fowler
889 Bryant St.
San Francisco 3, California

Valley Belting & Equipment Co.
2309 Los Angeles St.
Fresno, California

CONNECTICUT

Ideal Machinery Company
Plainville, Connecticut

Motor Equipment Co.
Wall & Water Sts.
Bridgeport 3, Connecticut

DELAWARE

The Briggs Rubber Products Co.
Wilmington, Delaware

Standard Industrial Supply Co.
403 Adams St.
Wilmington, Delaware

FLORIDA

Ellis & Lowe Co., Inc.
302-306 S. Morgan St.
Tampa, Florida

Farquhar Machy. Co.
720 West Bay St.
Jacksonville, Florida

General Equipment & Supply Co.
543 N. W. 5th Street
P.O. Box 1470
Miami, Florida

Industrial Marine Supply Co.
Pensacola, Florida

GEORGIA

Bearings & Drives, Inc.
515 Arch Street
Macon, Georgia

Georgia Hardware & Supply Co.
307 N. Washington St.
Albany, Georgia

Jim Horne Mill Supplies
Shellman, Georgia

Macon Supply Co.
Macon, Georgia

Phillips Hardware & Supply Co.
1022 Front Ave.
Columbus, Georgia

GEORGIA

Richmond Supply Co.
Augusta, Georgia

John D. Robinson Co.
13 Bay Street, West
Savannah, Georgia

J. M. Tull Metal & Supply Co.
285 Marietta St. N. W.
Atlanta 3, Georgia

IDAHO

Western Bearings, Inc.
320 Front St.
Boise, Idaho

Western Bearings, Inc.
156 South Third St.
Pocatello, Idaho

ILLINOIS

Hagerty Bros. Co.
923 S. Washington St.
Peoria 2, Illinois

W. M. Hales
P. O. Box 65
Danville, Illinois

W. M. Hales Co.
719 S. Main St.
Hillsboro, Illinois

W. M. Hales Co.
W. Frankfort, Illinois

Mid-States Industrial Corp.
2401 Eleventh St.
Rockford, Illinois

Northern Illinois Supply Co.
Carpentersville, Illinois

INDIANA

Diamond Supply Co., Inc.
616-24 N. W. Second St.
Evansville, Indiana

Sherer Electric Co.
940 S. West Street
Indianapolis 25, Indiana

The South Bend Supply Co.
South Bend, Indiana

KANSAS

Bearing Service Co.
341 N. St. Francis Ave.
Wichita 2, Kansas

W. A. Thomas Supply Co.
112-114 West Third St.
Pittsburg, Kansas

KENTUCKY

Ernest Hardware & Supply Co.
829 National Ave.
Lexington, Kentucky

Sherman Bros. Mill Supply
222 South Shelby St.
Louisville 2, Kentucky

LOUISIANA

Behring's Bearing Service, Inc.
Lake Carles, Louisiana

Dixie Bearing & Supply Co., Inc.
733 N. 21st St.
Baton Rouge, Louisiana

Weeks Supply Co., Ltd.
Monroe, Louisiana

Woodward Wight & Co., Ltd.
New Orleans, Louisiana

MARYLAND

Hagerstown Equipment Co.
Maryland Ave. & Memorial Blvd.
Hagerstown, Maryland

M. F. Holland Co.
Lee & Sharp Sts.
Baltimore, Maryland

MASSACHUSETTS

Bellamy-Robie, Inc.
43 Main St.
Cambridge, Massachusetts

Babcock Equipment Co.
163 Highland Ave.
Needham Heights 94, Mass.

MICHIGAN

Abrasive Supply Co.
821 W. Milwaukee Ave.
Detroit, Michigan

MINNESOTA

Iron Range Equipment Co.
490 N. Snelling Ave.
St. Paul, Minnesota

Jurgens Company
519 Cleveland Ave.
St. Paul 4, Minnesota

MISSOURI

Bonne Terre Farming & Cattle Co.
Bonne Terre, Missouri

Industrial Equipment Corp.
325 E. Walnut St.
Springfield, Missouri

Ta-Co, Inc.
801-805 N. Second St.
St. Louis, Missouri

Wildhagen Machine & Supply Co.
224 S. Third St.
St. Joseph 5, Missouri

MONTANA

Western Foundry Co.
802 Toole Ave.
Missoula, Montana

NEW JERSEY

Burton Supply Co.
165 Park Ave.
Paterson, New Jersey

Mill Supply & Hardware Co.
285-289 N. Willow St.
Trenton 4, New Jersey

Old Reliable Supply & Equipment Co.
11th St. & Newton Ave.
Camden, New Jersey

NEW MEXICO

Union Industrial Corporation
112 East Mermod St.
Carlsbad, New Mexico

NEW YORK

Laurence Belting Co.
111 Chambers St.
New York, New York

S. H. Pooley Belting Co.
38 W. Seneca Street
Buffalo 2, New York

Transmatic Equipment Co.
11 North Pearl St.
Albany, New York

U. & S. Inc.
509 South West Street
Syracuse, New York

Ulster Foundry Corp.
20 St. James St.
Kingston, New York

NORTH CAROLINA

Piedmont Mill Supply Co.
P. O. Box 130
Salisbury, N. Carolina

OHIO

Brubaker Gear & Mfg. Co.
Barberton, Ohio

Cincinnati Transmission Co.
3330 Montgomery Road
Cincinnati 7, Ohio

C. J. Edwards Company
6408 Euclid Ave.
Cleveland 3, Ohio

Lima Armature Works, Inc.
440 N. Main St.
Lima, Ohio

Mill & Factory Supply Co.
317—10th St.
Toledo, Ohio

Wilkof Hardware & Supply Company
1100 Warner Road, S. E.
Canton, Ohio

Winkle Electric Co., Inc.
701 Andrews Avenue
Youngstown 2, Ohio

OKLAHOMA

C. F. Dagwell & Company
816 W. Main St.
Oklahoma City, Oklahoma

Ore Reclamation Company
301 N. Connell Ave.
Picher, Oklahoma

OREGON

Electric Steel Foundry
Eugene, Oregon

Fisher Bros. Company
222 Bond Street
Astoria, Oregon

Industrial Machinery & Supply Co.
1410 Adams Avenue
La Grande, Oregon

Industrial Steel & Supply Co.
North Bend, Oregon

J. W. Minder Chain & Gear Co.
307 S. E. Hawthorne Blvd.
Portland 14, Oregon

PENNSYLVANIA

A. C. Supply Company
1330 Federal Street
Philadelphia, Pennsylvania

S. S. Brennor
2303 E. Philadelphia Street
York, Pennsylvania

Clark Materials Handling Equipment Co.
1407 Derry Street
Harrisburg, Pennsylvania

Industrial Supply Co.
451 E. Broad St.
Hazleton, Pennsylvania

Keystone Bearing & Supply Co.
Second and Hamilton Sts.
Allentown, Pennsylvania

Maximon Machine Co.
801 N. Logan Blvd.
Altoona, Pennsylvania

Reilly Bros. & Raub
44 N. Queen St.
Lancaster, Pennsylvania

Sherwin Bearing Co.
1120 Wyoming Avenue
Scranton 1, Pennsylvania

Transmission Equipment Co.
903 E. Carson St.
Pittsburgh 10, Pennsylvania

SOUTH CAROLINA

Crawford & Garner, Inc.
P. O. Box 1839
Spartanburg, S. Carolina

O'Brian Debnam Company
213 E. Evans St.
Florence, S. Carolina

Southern Mill Supply Co.
Summerville, S. Carolina

Thackston-Davis Supply Co.
828 Gervais Street
Columbia, S. Carolina

TENNESSEE

Hoyt N. Payne Co.
P.O. Box 942
410 E. Depot Ave.
Knoxville, Tennessee

Tennessee Machinery Co.
114-119 Third Ave., South
Nashville 3, Tennessee

Tippé Engineering & Supply Co., Inc.
260 N. Front St.
Memphis, Tennessee

TEXAS

Allied Belting & Trans. Co
2614 Sylvan Ave.
Dallas, Texas

Beacon Supply Co., Inc.
1825 Washington Ave.
Houston 10, Texas

Bearing Specialists Co.
2902 Texas
Lubbock, Texas

El Paso Machine Works, Inc.
1600 E. 4th St.
El Paso, Texas

Great Western Supply Co.
14th & Throckmorton
Fort Worth, Texas

E. B. Hayes Machinery Co.
Marshall, Texas

Lloyd Electric Co.
511 El Paso St.
San Antonio, Texas

Overton & Mims, Inc.
1307 Indiana
Wichita Falls, Texas

VIRGINIA

Blue Ridge Hardware & Supply Co.
Bassett, Virginia

Mill Supplies Corp.
South Norfolk, Virginia

WASHINGTON

Electric Steel Foundry
1327 Washington St.
Spokane, Washington

WEST VIRGINIA

Park Engineering Sales Co.
2391 Dudley St.
Parkersburg, W. Virginia

Bluefield Hardware Co.
Bluefield, W. Virginia

Smith Steel Supply Co.
150 Peninsula St.
Wheeling, W. Virginia

WISCONSIN

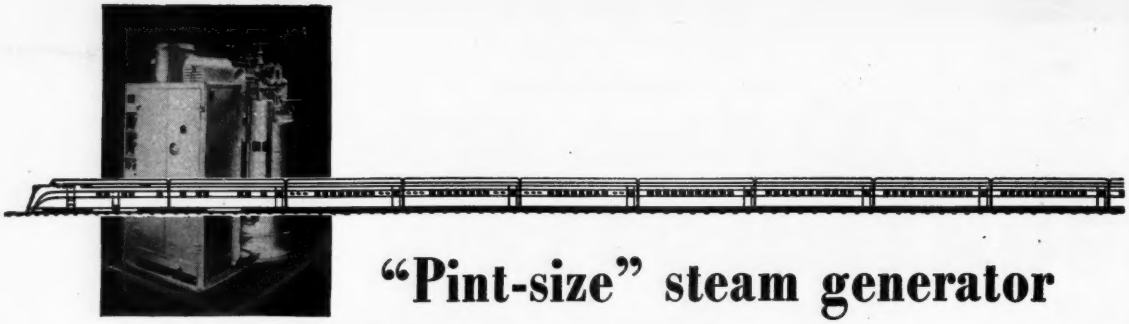
Dale Industrial Supply Co.
528 Forest St.
P. O. Box 867
Wausau, Wisconsin

Richard E. Ela Co.
744 Williamson St.
Madison, Wisconsin

The Union Chain and Manufacturing Company • Sandusky, Ohio, U.S.A.

TRANSMIT POWER
UNION CHAINS
CONVEY MATERIALS

ATTACHMENTS • SPROCKETS • FLEXIBLE COUPLINGS • FOR ALL INDUSTRIES



"Pint-size" steam generator warms a whole diesel train

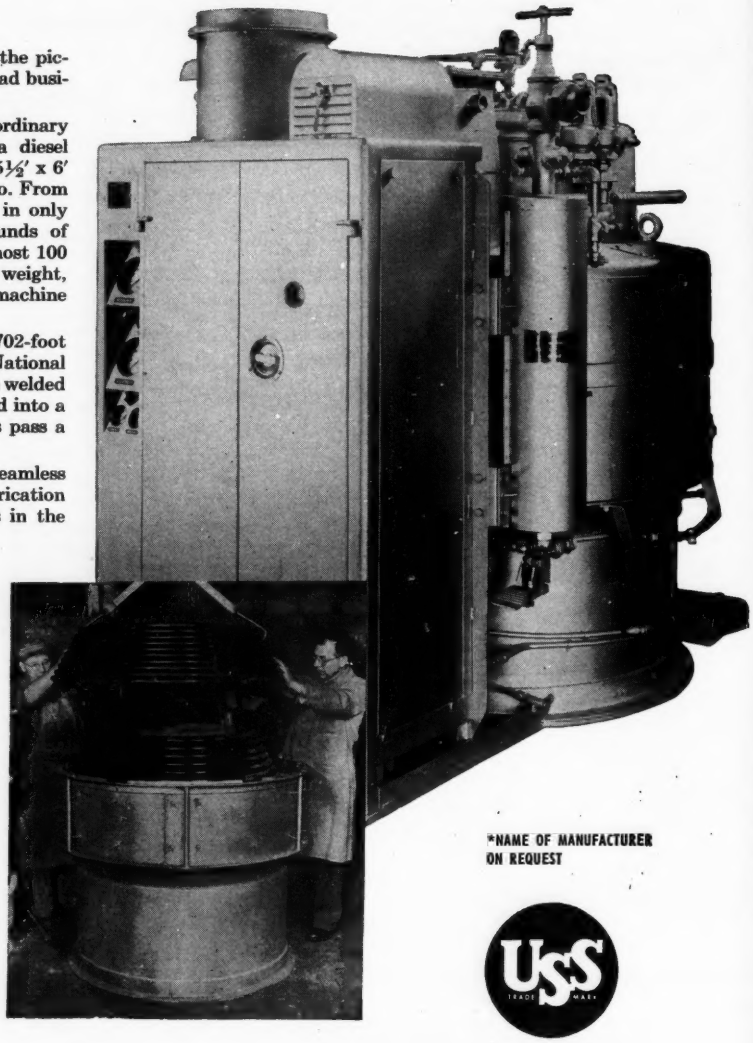
That Vapor-Clarkson steam generator* in the picture has caused a real stir both in the railroad business and out of it.

Even though it's no bigger than an ordinary clothes closet, it does the one big job a diesel locomotive can't do by itself—this 3½′ x 5½′ x 6′ generator can heat an entire train. Fast, too. From a cold start, it will deliver 200 psi steam in only two minutes. Capacity is over 4500 pounds of steam per hour. That's enough to heat almost 100 homes in dead zero weather. For size and weight, this is the most powerful steam-making machine developed by industry.

Heart of this ingenious generator is a 702-foot long set of continuous coils made from National Seamless Steel Tubing. Standard lengths are welded into 200 or 300 foot lengths, then cold rolled into a coil. All coils are interchangeable. All coils pass a 1200 pound hydrostatic pressure test.

This is another instance of National Seamless doing a fine job, despite the exacting fabrication methods and rigorous tests. The reason is in the tubing itself—in that magic word, "Seamless." There aren't any longitudinal welds to weaken the tube. Each tube is pierced from a solid billet of steel . . . the *one* method that removes all doubt concerning wall strength.

When planning the use of seamless pipe or tubing for future needs, be sure to specify National Seamless, made by the world's largest and most experienced manufacturer of tubular steel products.



*NAME OF MANUFACTURER ON REQUEST

NATIONAL TUBE DIVISION
UNITED STATES STEEL COMPANY
PITTSBURGH, PA.
(Tubing Specialties)
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS TRADE MARK

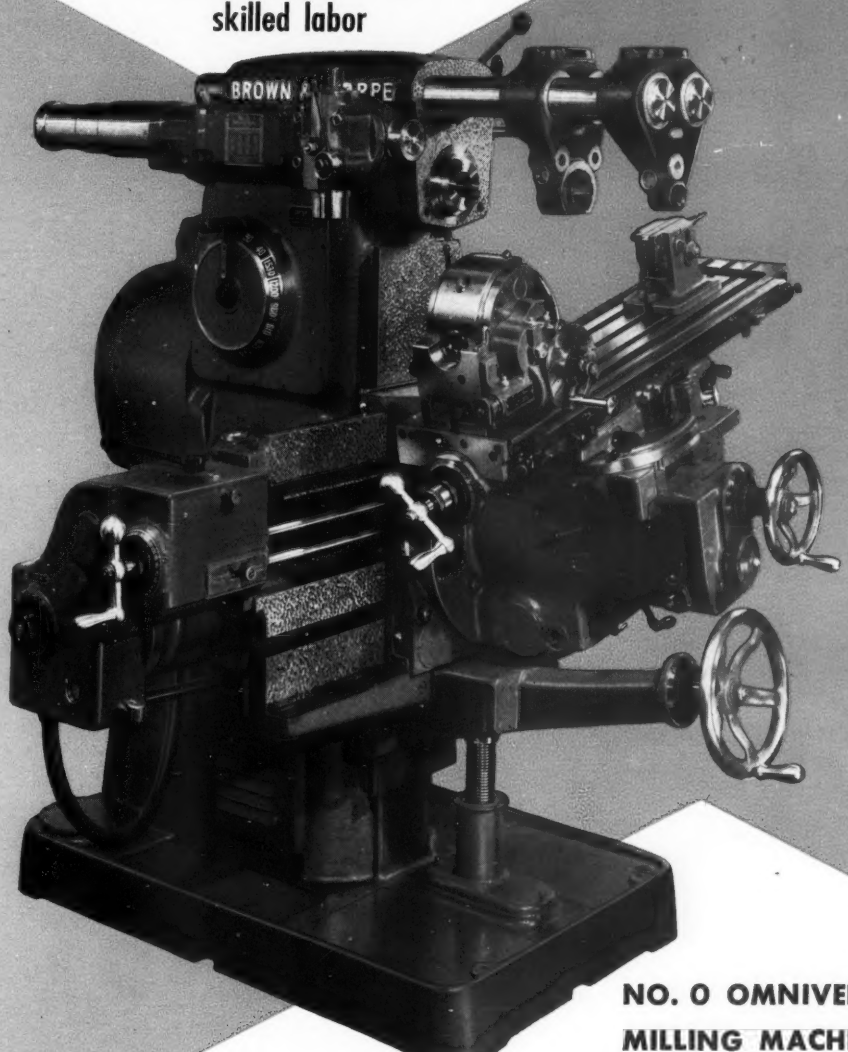
U·S·S NATIONAL *Seamless* PIPE AND TUBES

UNITED STATES STEEL

JB·S

Productioneered

for extreme versatility, high precision, and conservation of skilled labor



NO. 0 OMNIVERSAL MILLING MACHINE

The flexible controls of this machine equip you to meet the widest variety of change-overs quickly and easily. It's "Productioneered" to keep your work-flow in toolrooms, experimental and research laboratories at a continuously high level. Work may be milled in a number of planes, or drilled, bored, or reamed at many different angles without relocating work in holding devices. Write for full details.

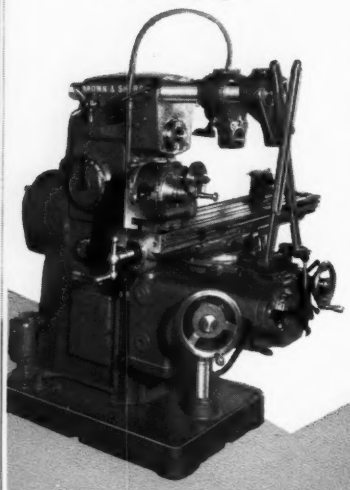
See next page for other Brown & Sharpe "Productioneered" Milling Machines.

Brown & Sharpe

B·S

Productioneered

for ready adaptability to unusual or ordinary jobs



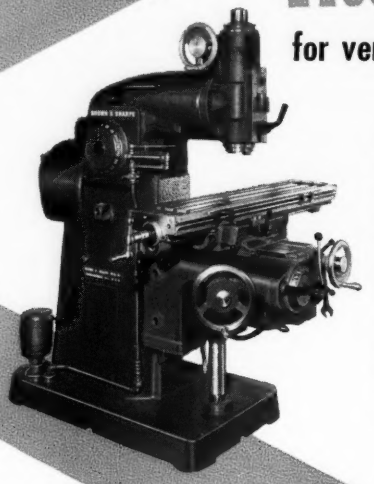
No. 2 UNIVERSAL MILLING MACHINE 5 H.P.

The extra versatility of this Brown & Sharpe Universal equips you to meet sudden demands for change-overs quickly and easily — makes shorter runs more profitable — permits continuous high level production in spite of sudden product changes. Product-boosting features include: tri-motor drive, quick speed and feed selection, time-saving controls and extended spindle face. (Same features available in 3 H.P. machine.)

B·S

Productioneered

for versatile vertical milling



No. 2 VERTICAL MILLING MACHINE 5 H.P.

This vertical incorporates the time-saving features of the 5 H.P. Universal and Plain Machines, as well as the versatile swiveling spindle head which permits milling surfaces or drilling holes at different angular positions without use of special fixtures. (Same features available in 3 H.P. machine.)

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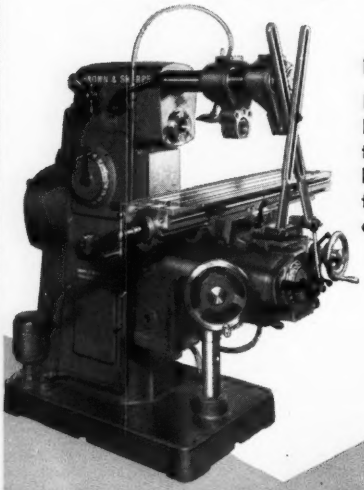

No. 2 PLAIN MILLING MACHINE 5 H.P.

Designed for rapid, easy set-up and handling . . . built with more-than-adequate rigidity that maintains the original accuracy through long economical life. Efficient tri-motor drive, exclusive extended spindle face, time-saving controls. (Same features available in 3 H.P. machine.)

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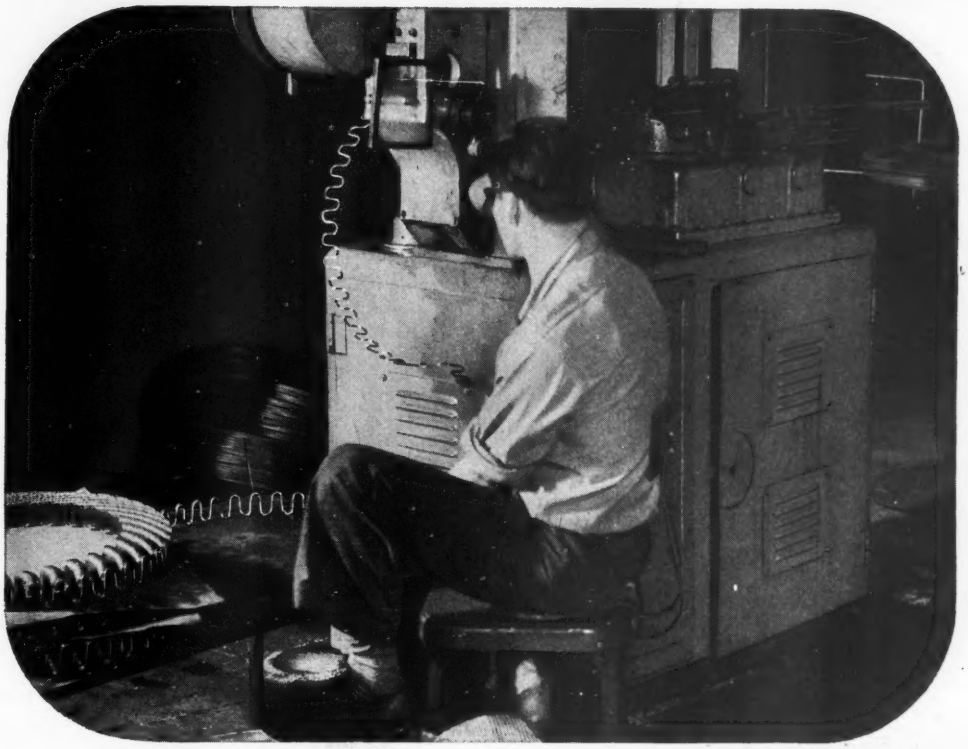

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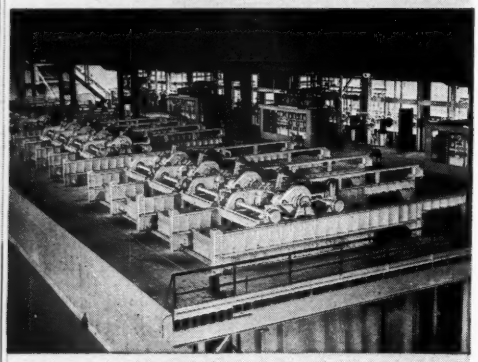
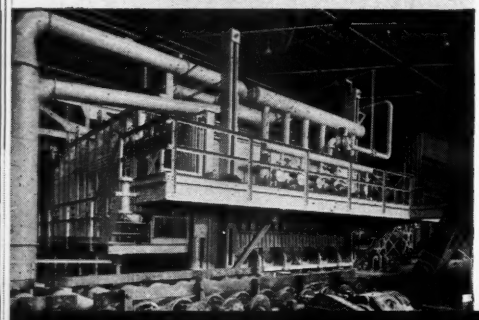
One-way fired soaking pits.



Slab heating furnaces.



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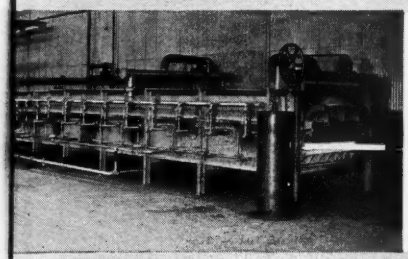
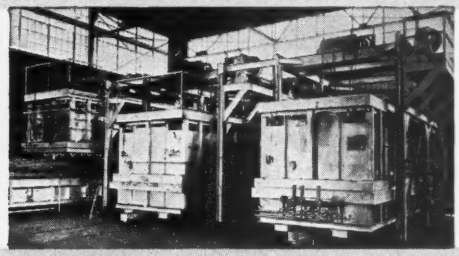
heat FROM INGOT THROUGH FINISHED PRODUCT

Wire patenting furnaces.

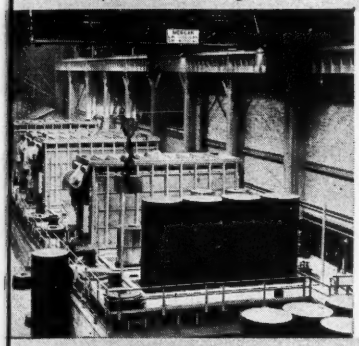


Batch type carbon correction annealing furnaces.

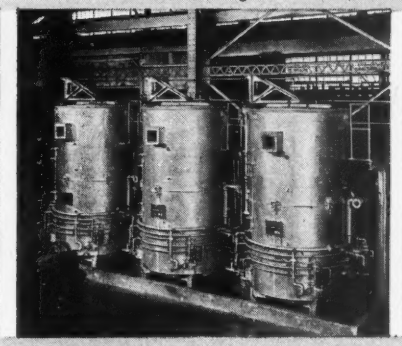


Continuous bright annealing and normalizing furnaces for tubing.

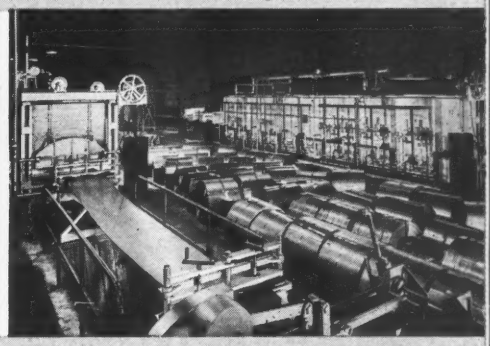
trolled atmosphere coil annealing covers.



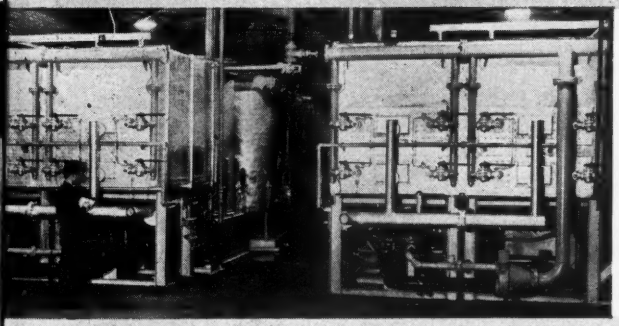
Pit type convection furnaces for rod annealing.



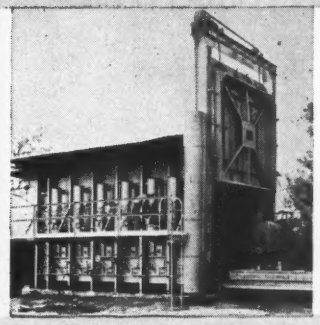
Continuous strip annealing and normalizing furnaces.



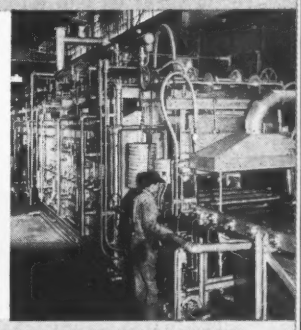
Prepared atmosphere generators.



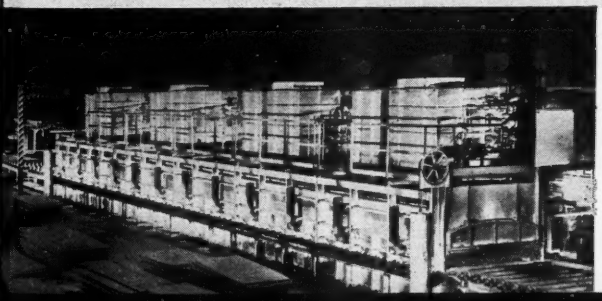
Stress relief furnaces.



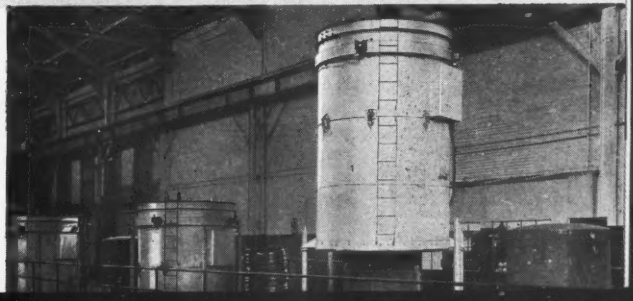
Continuous controlled atmosphere annealing furnaces.

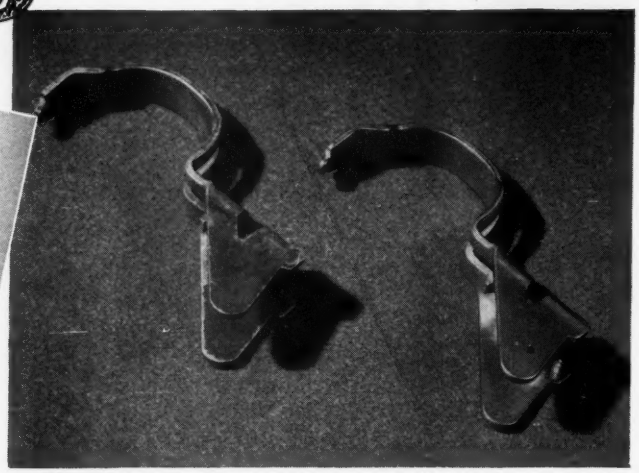


Continuous armor plate heat treating furnaces.



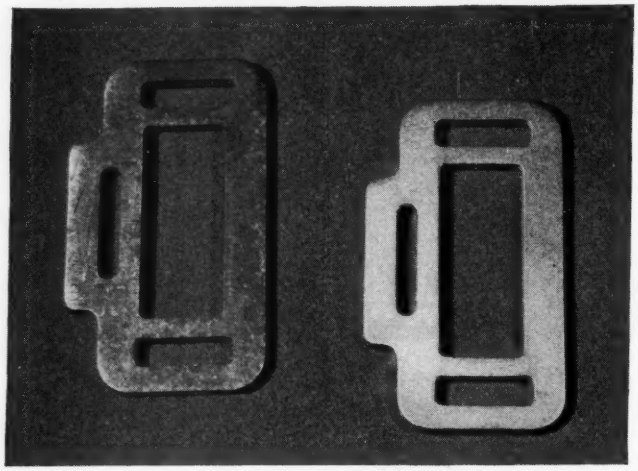
Controlled atmosphere wire and rod annealing covers.





REMOVING HEAT-TREAT SCALE and deburring the hard-to-get-at areas on these steel trigger guards with ALUNDUM Tumbling Abrasive helped speed up the finishing of these defense items.

You can BARREL-FINISH *to* BLUEPRINT ACCURACY *with Norton* ALUNDUM* *Tumbling Abrasive*



DEBURRING these parachute buckles — particularly the inner surfaces — is a good example of how barrel-finishing with ALUNDUM Tumbling Abrasive can solve a tough finishing job.

You get real *precision finishing* with Norton ALUNDUM Tumbling Abrasive. Being all aluminum oxide — not a bonded material — its cutting action is continuous, without glazing. It has the hardness required for fast, positive cutting and the hardness and toughness for long, productive service life.

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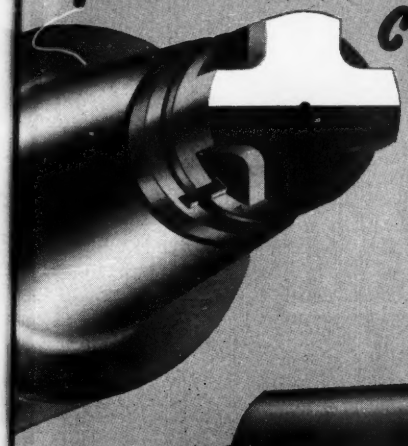

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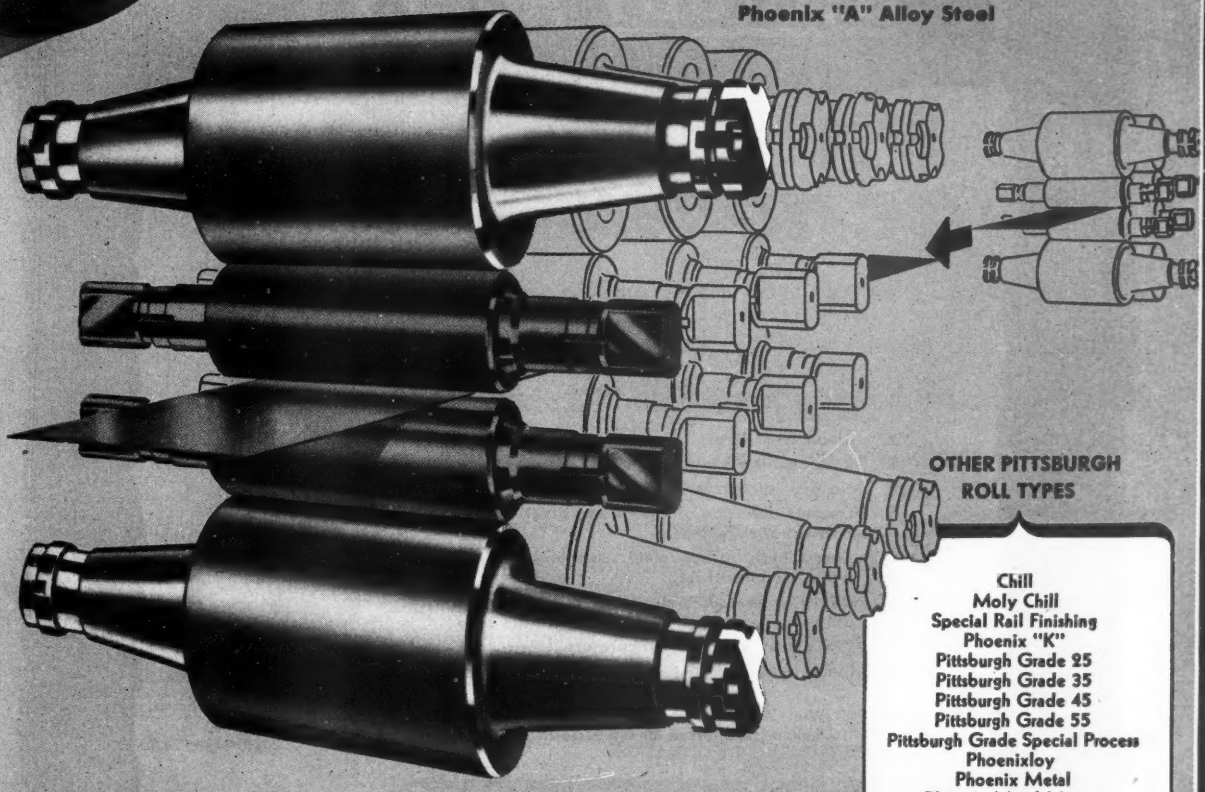

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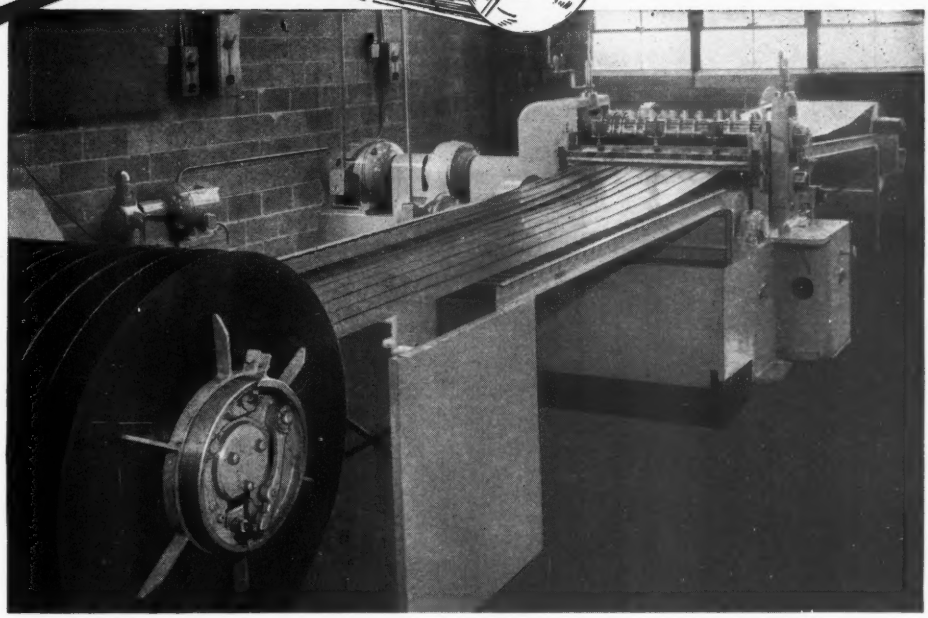

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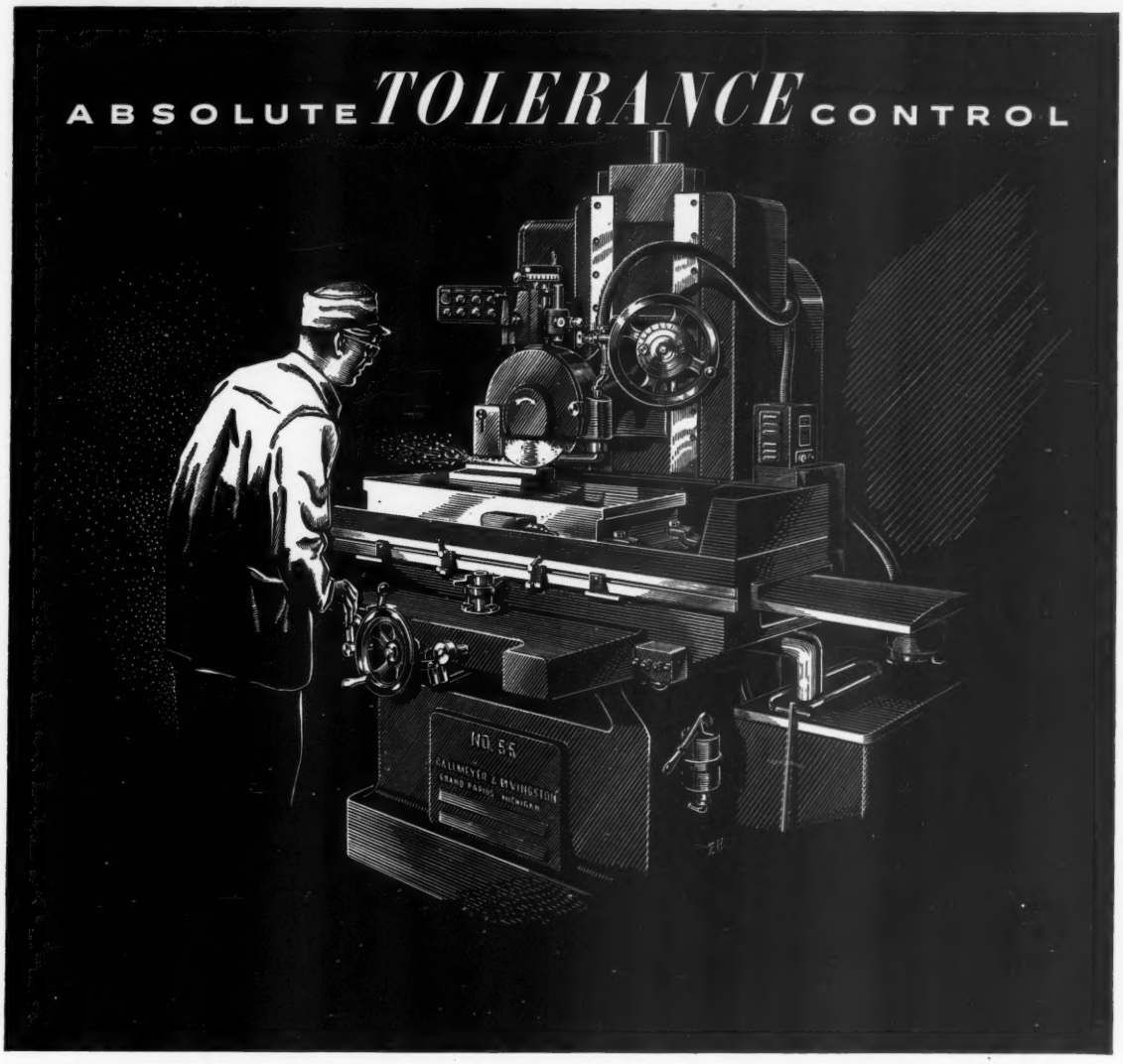

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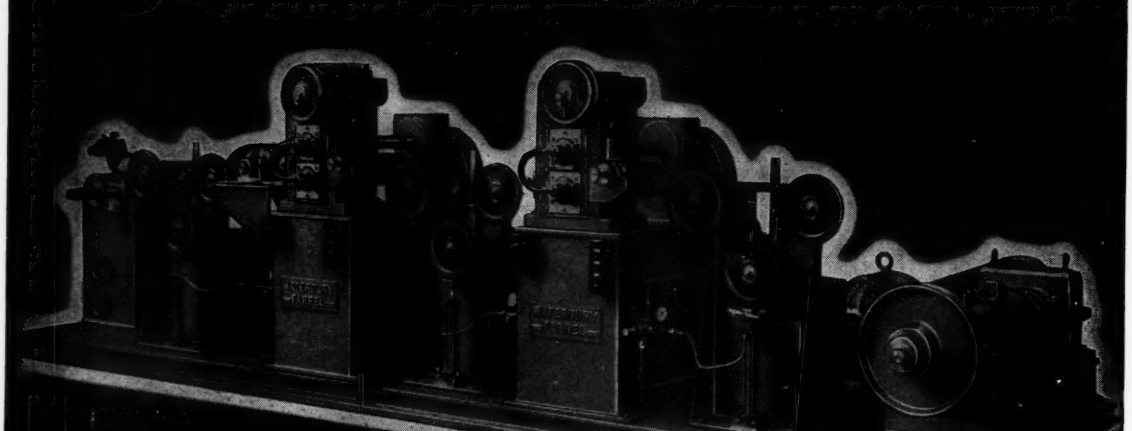

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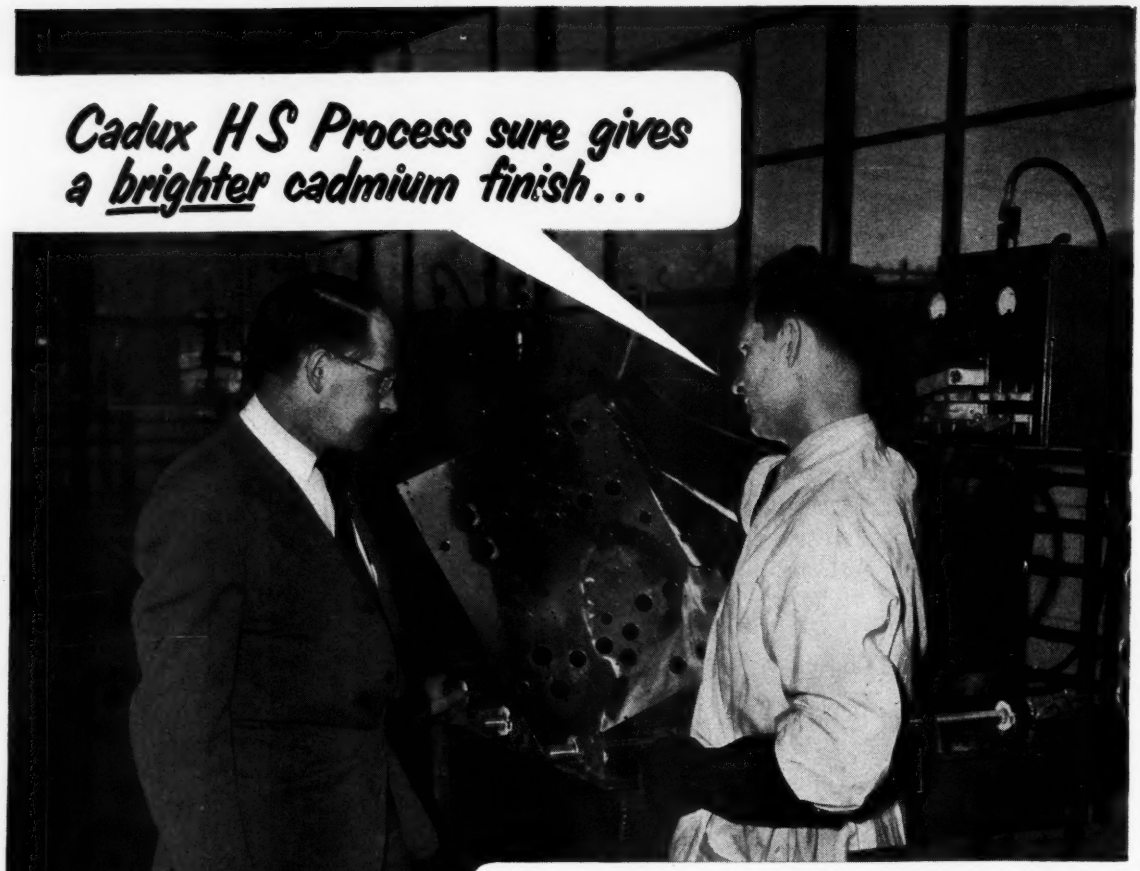

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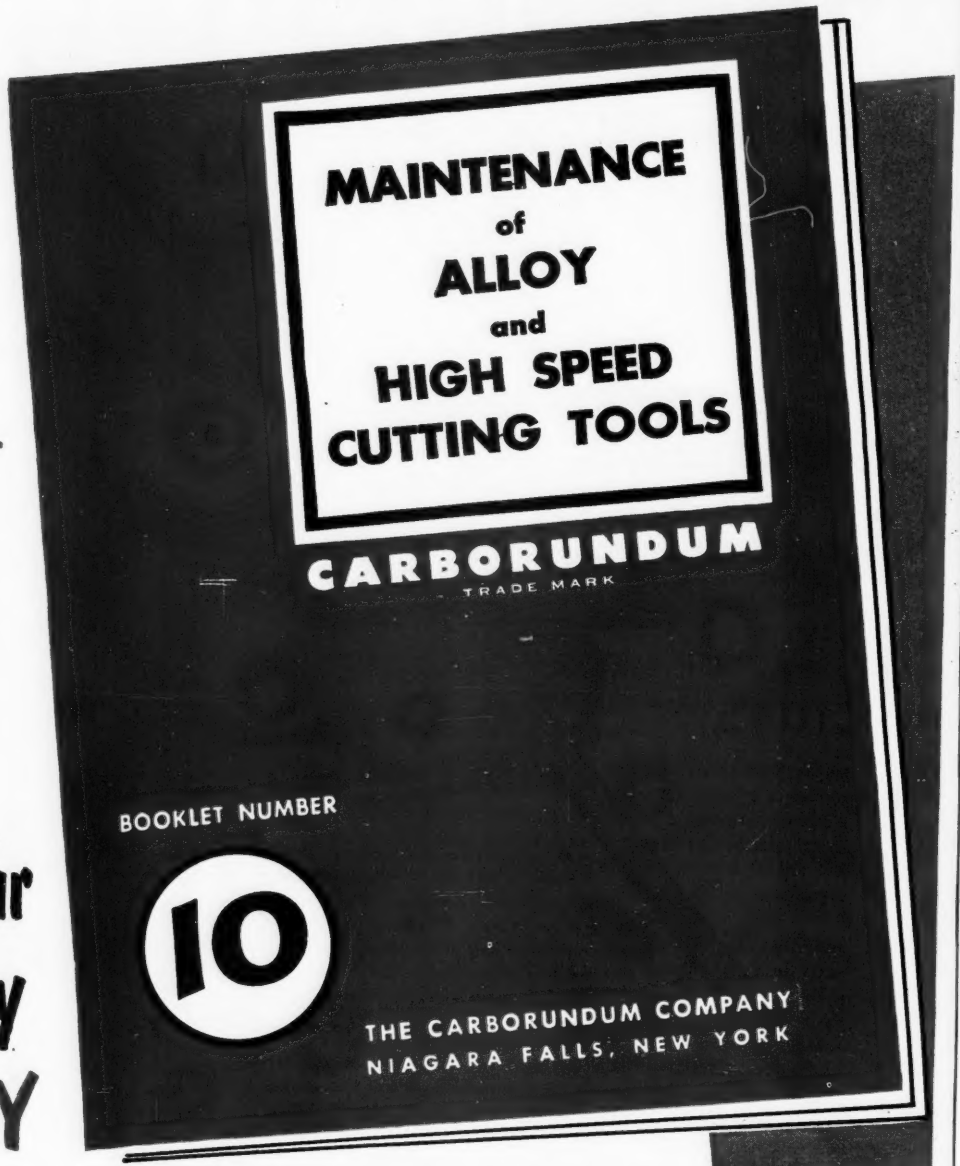

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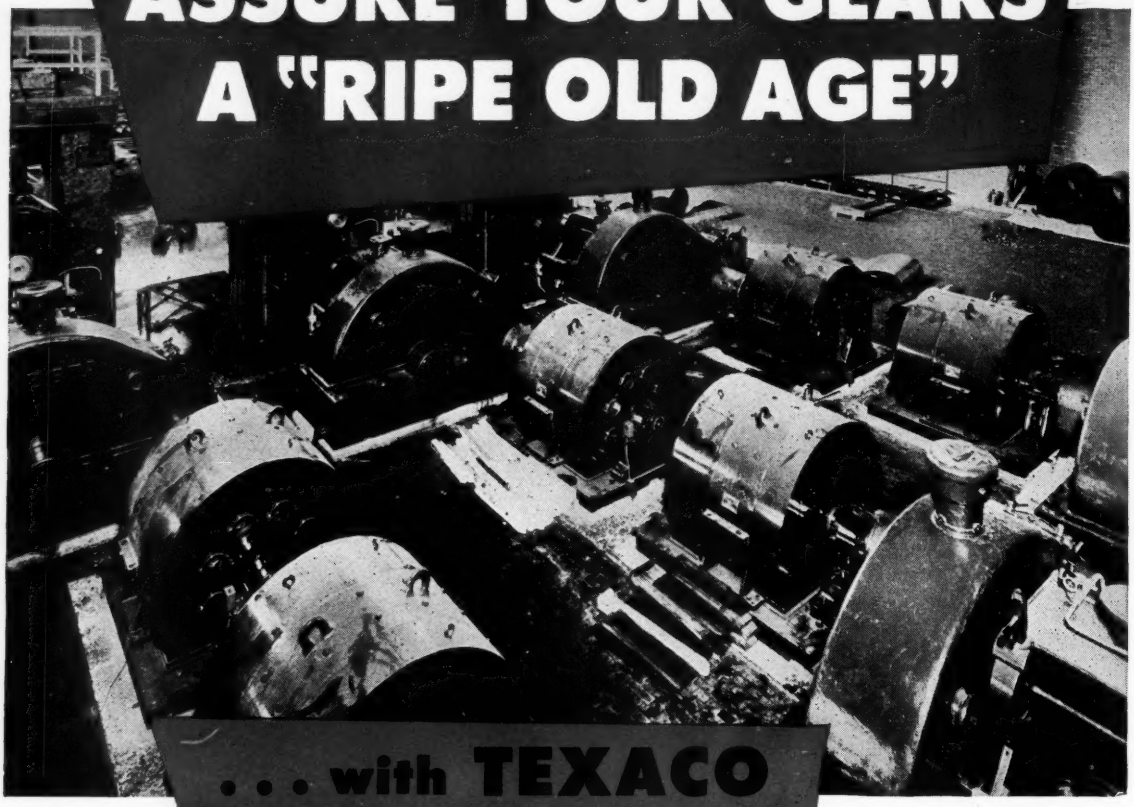

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The Metalworking Outlook

June 16, 1952

Tough Job

Steel, government and union officials began conferring June 12 on ways and means to get enough steel made for defense. The proposal to open some struck facilities poses problems, but at least finished steel in closed mills and warehouses will be released. Demand on open warehouses by defense users is not as hectic as might be expected. Bulk of the defense needs may be met by the 13 per cent of the steel industry still operating. Ingot production in May was 8,261,000 net tons, smallest for any 31-day month since August, 1950. Output for the first five months this year totaled 43,449,660 tons, only 192,000 tons lower than in the corresponding part of last year.

Hold Tight on Price Contracts

As a steel user, you will be wise in steering clear of any firm pricing contracts on your product for a while. OPS won't admit it officially, but the agency plans to allow price increases in all products using steel in ratio to the price hike in steel, once it comes.

Ammunition for Controls

The steel strike gives ammunition to those congressmen who want CMP, at least in a skeleton form, continued until 1955. Rep. Wright Patman (Dem., Tex.) leads a group from his Small Business Committee that believes "small business is the first to suffer when materials become scarce and would be the first victim of premature or haphazard lifting of controls on steel, aluminum or copper." He and his cohorts also oppose any open-end CMP.

Price Lids To Be Kept

Congress also is certain to keep price controls, probably until June, 1953. That's despite strong evidence the price controls today exert little influence on prices. The National Industrial Conference Board just completed a survey of 157 manufacturers on the subject. The majority feels OPS is "exerting little influence" on current prices. Agreement was almost unanimous for early decontrol.

Copper Improves

Copper supplies are improving. By the end of this year the red metal's shortage may not be a seriously limiting factor in production of finished goods. The switch from copper to aluminum that occurred to some extent during the peak of the shortage could now reverse itself. Some shifts did not work out too well although others are satisfactory, such as the use of aluminum bases for light bulbs. Telephone companies find that aluminum wire for many applications must be two gages heavier than the copper material to do the same job. So, the switch to aluminum there has not been as extensive as it was first thought it might be.

Personal Income High

Don't be misled by the phenomenally high personal income figures just released by the Department of Commerce. In the first four months

Production-Engineering News—p. 95 *The Market Outlook—p. 195*

of this year people across the nation took in income at the annual rate of nearly $259 billion, about 5 per cent more than in the like 1951 period. Five per cent is just about the extent of the price rise between the two periods. What's more, people have heavy debts to pay off; consumer credit outstanding is now around $19.6 billion, compared with $19.4 billion a year ago.

Garbage and Metalworking

Keep your eye on home incinerators. Some communities are already requiring the installation of incineration facilities in new homes, and others are considering the move. Savings in city garbage collection costs are being cited. The handful of companies in the U.S. that make the product foresee excellent markets.

Mail Order Houses Tighten Up

Mail order firms, often considered to be the sharpest forecasting experts in merchandising, are now exerting extra pressure on their contract manufacturers of hard goods to cut prices. Mail order prices of hard goods are usually about 6 per cent less than the customary retail quotations anyway, so companies dealing with mail order houses are sharpening their pencils to refigure costs. Sales are especially light in some types of hand and garden tools, and that line is getting particular attention.

Straws in the Wind

Cleveland Electric Illuminating Co. purchased 413 acres for development of factories in northeastern Ohio in one of the first such moves taken by any utility in the country . . . Chesapeake & Ohio Railway has a new low-slung railroad passenger car built by Pullman-Standard Car Mfg. Co. that rides on two wheels like a trailer behind a truck . . . A duty of 1-1/16 cents a pound on imported lead will be restored before the end of June because of the drop in the price of the metal . . . Eastern Stainless Steel Corp. expects its ingot capacity will be more than doubled when it completes construction this fall of a new arc melting furnace at Baltimore . . . NPA is cancelling the relaxations it was to allow July 1 in CMP Reg. 6, the construction order.

What Industry Is Doing

The steel dispute has five long-term implications for all industry (p. 67) . . . Sympathy strike of iron ore workers won't hurt present low steel operations (p. 68) . . . Builders won't get more middle-class housing from relaxation of Regulation X (p. 69) . . . More plants will close down for vacations this summer (p. 70) . . . Progress is reported in setting international hardening standards for iron and steel (p. 71) . . . A new tank gun range finder is successful (p. 72) . . . Metalworking companies are getting a smaller slice of total tax amortization certificates (p. 78) . . . The market potential for industrial air conditioners is great (p. 79) . . . Aluminum bonding of steel and nonferrous metals pays off (p. 82).

Westinghouse-Sturtevant fans are used in this special Environmental Test Chamber that duplicates air conditions from sea level to 20 miles up for testing RCA electronic equipment.

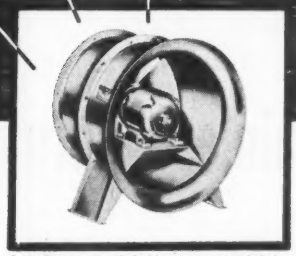
HOW DO ELECTRONIC DEVICES BEHAVE 70,000 FEET UP?

Lives depend on the answers found in this atmospheric testing chamber in type-test laboratories of RCA's Engineering Products Department. But the answers aren't easy to get. For the big problem is to duplicate as accurately as possible the thin, cold air of high altitudes.

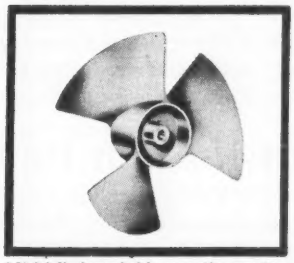
The solution? Powerful Westinghouse-Sturtevant Axiflo Fans constantly circulate chilled air, force temperatures down as low as –85°F. Working against a partial vacuum, created to simulate low pressures encountered in the upper regions of the stratosphere, these fans keep temperatures uniform to within several degrees by providing a homogeneous mixture of air throughout the chamber.

No matter how you want to *put air to work*—whether air handling, air conditioning or air cleaning—Westinghouse offers you a complete line of industry-proven equipment to fill your needs. For complete details, call your local Westinghouse-Sturtevant office. When you do, also ask for new General Catalog 600—a 60-page reference file for Putting Air To Work. Westinghouse Electric Corp., Sturtevant Division, Hyde Park, Boston 36, Mass.

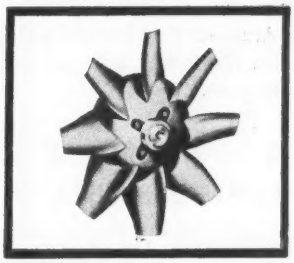
Test Chamber designed and installed by Tenney Engineering, Inc., Newark, N. J.



Axiflo Pressure Fans find wide use throughout industry because of adaptability to duct systems and for discharge against high winds.



3-Bladed Aluminum wheel is non-sparking, corrosion-resisting; handles large volumes.



8-Bladed Steel Wheel is non-overloading, quiet and stable; ideal for high temperatures.

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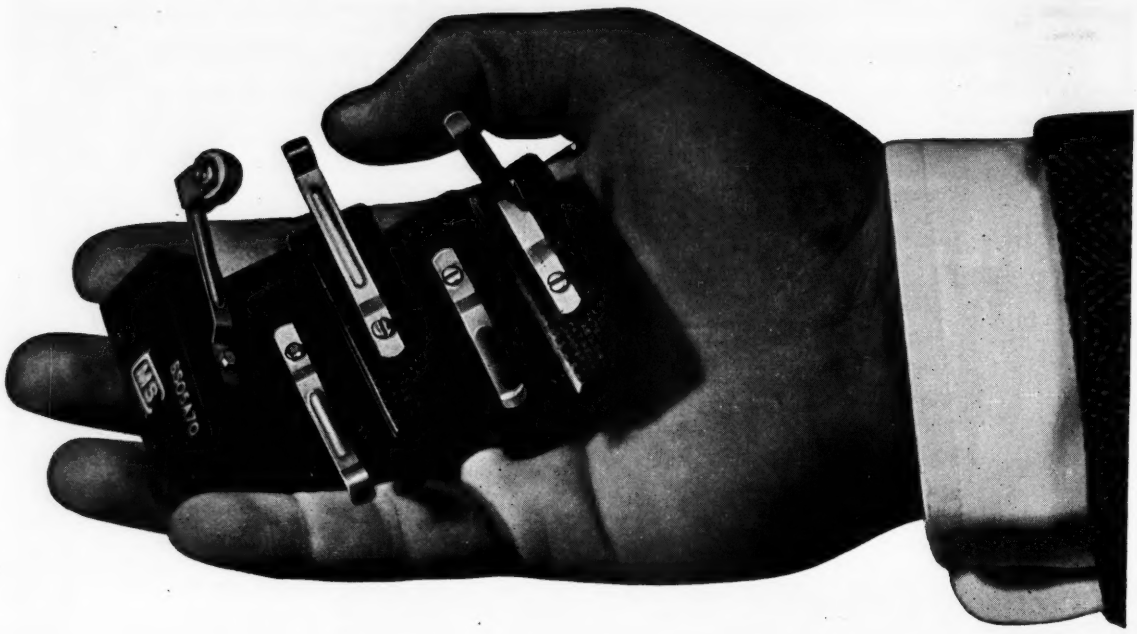

Stainless springs that take 100 MILLION blows!

These miniature precision switches are built to close and open as many as 100 million times—without a miss. Steel that takes an early permanent set cannot be used in the actuators of these switches. Operating clearances are often critically small and even a slight change in the position of the actuator may make the switch useless.

Armco 17-7 PH is the answer

Armco 17-7 PH Stainless Steel flat wire has solved major problems in these switches. Drift characteristics of this spring steel have been found superior to any other material tested. In addition, switch-life has been increased many times because of the great flexure endurance of the metal. Armco 17-7 PH is also highly corrosion resistant —another reason why it is used instead of ordinary carbon spring steel.

Takes severe forming

For the odd shapes required in switch actuators, Armco 17-7 PH can be cold formed without breaking. Its remarkable mechanical properties are then developed after fabrication through a low-temperature heat treatment at 900 F for 30 minutes.

Actuators made of standard types of stainless steels, soft enough to form properly, have poor spring characteristics. They will take a permanent set after relatively few operations. And standard stainless steels with good spring characteristics will crack or fracture if severely worked.

What the user says

The manufacturer of these switches uses Armco 17-7 PH in flat wire in more than 125 leaf spring designs.

This is what his engineers say about Armco 17-7 PH:

"There is no substitute known to us should this material not be available."

If you have a spring problem you will want to know more about Armco 17-7 PH. Write us for complete data.

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His Forgotten Oath

When President Truman took oath of office, he swore solemnly that "I will faithfully execute the office of President of the United States and will, to the best of my ability, preserve, protect and defend the Constitution of the United States."

Two weeks ago, the Supreme Court ruled that his seizure of the steel industry was a violation of the Constitution. One would think that Mr. Truman—informed by this ruling that he had broken his oath—would have at least assumed a contrite and humble attitude. Instead he rushed into Congress and asked the lawmakers to vote him authority to do what the Supreme Court had forbidden.

Most members of House and Senate know full well that Mr. Truman is in some sort of a deal with Philip Murray to help the cause of the union. Many of them also know what Mr. Truman does not seem to realize and that is that helping the union or helping Mr. Murray does not necessarily mean helping union members.

Therefore it is not surprising that within 24 hours after the President asked for seizure legislation, the Senate not only defeated four proposals for seizure but also voted 49 to 30 to request Mr. Truman to employ the Taft-Hartley law in the present dispute. This he has stubbornly refused to do. Reports from Washington indicate that he will continue to refuse to use T-H unless the House joins the Senate in requesting him to do so.

Section 3 of Article II of the Constitution provides that the President "shall take care that the laws be faithfully executed." The Taft-Hartley act is a law of the land, passed not only under regular procedure but also over presidential veto. Mr. Truman, in not "faithfully executing" this law, is assuming that he is above the law and is also violating for the uncounted time his solemn oath of office.

Ending the steel strike quickly is extremely important, but it is not as vital as the problem of curbing Mr. Truman's zeal for dictatorship and of restoring the nation to a government by law.

E. C. Shaner

EDITOR-IN-CHIEF

BLACK SHEEP IS HERO: Decision by the Supreme Court that President Truman acted illegally in seizing the steel industry takes on added significance when one considers the circumstances under which the justices were appointed.

Early in 1937, President Franklin Roosevelt launched his infamous attack against the "Nine

Old Men." On Feb. 5 of that year he brazenly asked Congress for power to enlarge the Supreme Court to 15 justices, on the ground that new appointments by him would offset the influence of elderly members who refuse to retire. On July 22 the Senate rejected his proposal emphatically by burying it in committee by a vote of 70 to 20. Thus slapped down, Roosevelt on Aug. 12 appointed Sen. Hugo Black to the court. In spite of considerable opposition, he was confirmed by the Senate on Aug. 17.

Then followed four other "court packing" appointments: Reed in 1938, Frankfurter and Douglas in 1939, and Jackson in 1941. Presumably these were "liberals" to offset the "baneful" influence of the elders. Later, President Truman appointed Burton in 1945, Vinson in 1946 and Clark and Minton in 1949.

Of the five "packed" appointments by Roosevelt, only one—Reed—dissented on the steel seizure decision. Of Truman's appointees, two—Vinson and Minton dissented. There is ironic justice in the fact that Hugo Black, thrown at the Senate by Roosevelt in petulant mood, presented the majority opinion in the steel seizure case.

* * *

WHY HE SPURNS T-H: Last offer of the six major steel companies submitted last Monday provided for a general increase in wage rates averaging 16 cents per hour and substantial increases in fringe benefits. The offer represented total employment benefits costing the companies 24.6 cents per hour. It denied the union's demand for the union shop and provided that other matters such as the management clause, seniority and incentives be satisfactorily resolved.

If this offer were presented to union members for vote by secret ballot, as provided in Sec. 209 b of the Taft-Hartley Act, it is likely the steelworkers would accept it. That probably is a major reason why President Truman is so set against using T-H in this instance.

* * *

WHO ARE THE BIGGEST? If you listen to the current rantings from Washington on the alleged curse of "bigness," you gain the idea that industrial corporations are the chief culprits. But if mere "bigness" is a crime, then the worst charge that can be made against the metalworking industry is a misdemeanor. Metalworking companies rank surprisingly low in the roster of giants.

United Press last week listed 60 members of the "Billion Dollar Club." Members are corporations whose assets total a billion dollars or more. Of the five dozen, 23 are banks, 13 are life insurance companies, six are railroads, six are oil companies, four are public utilities, one (Sears, Roebuck) is in merchandising and one (DuPont) is in chemicals. This accounts for 54 of the 60, without including a single representative of the metalworking industry.

The remaining six are in metalworking: General Motors (ranking 10th among the 60) and Ford Motor (ranking 42nd); U. S. Steel (12th) and Bethlehem (37th); and General Electric (43rd) and Westinghouse Electric (60th). Keep these figures in mind as a realistic perspective on bigness!

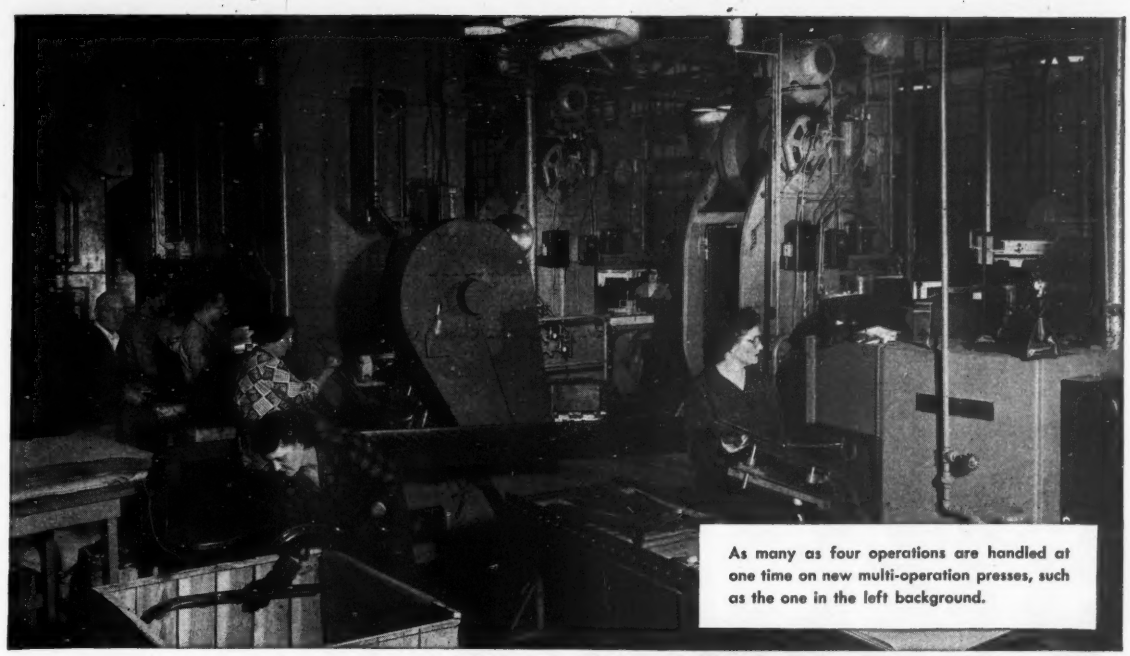
* * *

WHOLESOME DISPERSAL: A government report on the granting of certificates of necessity for expansion (p. 78) stresses the factor of dispersion—an attempt to decentralize production facilities. An analysis of 900 plants shows that 46 per cent were outside metropolitan areas, 42 per cent were in suburban sections of industrial metropolitan areas and 12 per cent were inside central cities.

If this is intended to indicate that current dispersal is largely a result of government policy, it is exaggerated. Thousands of industrial corporations are decentralizing—not necessarily because of government influence—but more often because of dozens of other valid reasons. Industrial operations are springing up in regions heretofore untouched by manufacturing activity. It is a wholesome development.

* *

TAMING THE COMPLEX: One of the marvels of recent progress in technology is the manner in which complex techniques can be simplified so that persons of ordinary ability can apply them effectively. A case in point is the use of ultrasonics in inspection and measuring operations. Few laymen understand the principle of ultrasonics, much less the phenomenon known as piezoelectric. Yet recent research has brought about the development of semiautomatic ultrasonic testing instruments by which an operator, after only a brief period of instruction, can inspect metal parts (p. 99) for cracks, laminations, voids and other defects accurately and at reasonable production speeds.



As many as four operations are handled at one time on new multi-operation presses, such as the one in the left background.

ASSEMBLY OPERATIONS
CLOSELY INTEGRATED WITH AUTOMATIC PRESSES FOR LOW-COST PRODUCTION
AT Firestone

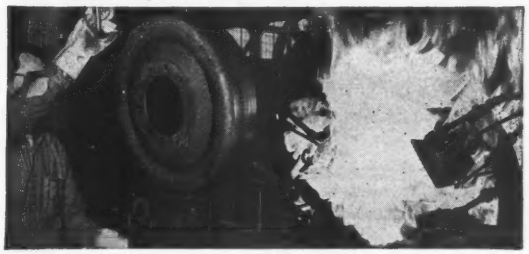
Assembly operations, closely integrated with presses, are a part of the fast, efficient straight-line methods used at the Firestone Metal Stampings Division. If the sub-assemblies require heat treating, welding and finishing, such operations are likewise integrated in the high-speed, low-cost production.

No matter how many operations are required, your job never leaves the plant at Firestone until it is loaded in the car for you. Precious time is saved, tight production schedules roll through as planned. There's just one responsibility — Firestone to you.

For complete analysis and recommendation for a low-cost, on-time production job for you, contact Metal Stampings Division, Firestone Steel Products, Akron 1, Ohio.

Enjoy the Voice of Firestone on Radio or Television Every Monday Evening over NBC

A completely automatic-synchronized press producing 2600 large size blanks per hour from steel fed from roll at extreme left background.



Special heat treating equipment provides for proper conditioning of steel to its specific use. It assures high-speed, accurately controlled, uniform results.

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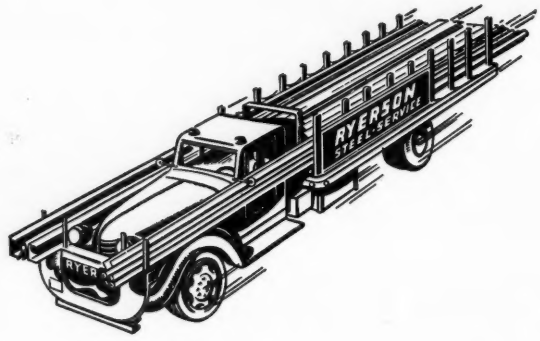

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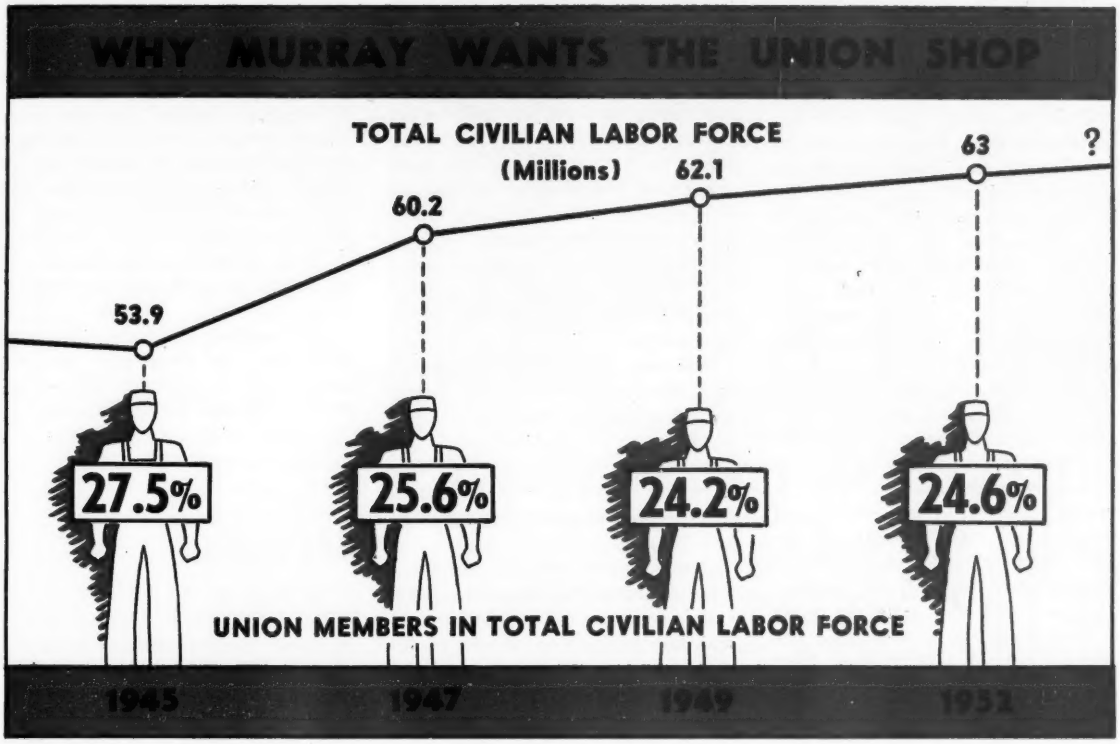


Although the total civilian labor force is growing, organized labor hasn't kept pace. Union membership in 1945 was 14.8 million, 15.4 million in 1947, about 15 million in 1949, is an estimated 15 million for 1952

Steel Case: Omens for Industry

The epic steel wage dispute will bring economic and legislative adjustments and new trends in labor-management relations

"THE STEEL CASE: An event ranking with the Korean war in its implications for all industry."

That's the appraisal of one steel executive. Here's why:

Five Effects — Aside from the steel dispute's constitutional implications which will have an indirect although important bearing on economic activity, the case will bring five direct and major effects on your business or on the way you can conduct it in the years ahead. One implication is economic—the loss of steel, the loss of earning power by striking steelworkers. Another is legislative—a new labor law is forthcoming, more quickly and more drastic than if the steel case had never occurred. The next three implications all apply to labor-management relations for a long time coming because in the exhaustive seven-month proceedings in steel the United Steelworkers of America-CIO tipped the hand of all organized labor regarding its long-range objectives — the union shop, more voice in management and a new approach on money matters.

Economic—The steel strike may well have a deflationary effect on the economy, not inflationary, despite a possible steel price hike and a pay boost to workers. Some 600,000 steelworkers and more than 100,000 employees in corollary industries have in the past two weeks lost nearly $100 million in wages —and in purchasing power. Even with a 20 to 25-cent pay boost, it will take a long time to regain that loss. A steel price hike could set off another inflationary spiral but it may soon stop. We're in a buyers' market now, and many steel users could elect to absorb the increased cost of the metal rather than raise their prices.

A steel strike would be definitely inflationary if it results in such a steel loss that users are forced into a mad scramble for it as they were from 1946 through 1948 and from mid-1950 until early this year. But there's no sign now that we're in for such a situation. Most consumers still have fair stocks of the metal. As of June 14, only 3 million tons of ingots less had been produced to that date this year than in the comparable period of 1951. Many market analysts foresee a 1952 steel demand of 105-110 million tons, equal to or only a little more than the 1951 production. Enough added steel capacity will be coming in over the rest of the year to make up easily the 3-million-ton loss thus far. (For a detailed analysis of the

steel supply situation, see p. 195).

Legislative—The second important implication of the steel case will be legislative. Congressional Republican leaders, Sen. Robert Taft and Rep. Joseph Martin, had planned to keep quiet on labor legislation until after the elections but President Truman forced the issue June 10 with his request for seizure powers, and Congress's subsequent "no" morally obligates the body to do something constructive. What may finally result legislatively in the next few weeks is a strengthened Taft-Hartley Act with some of the teeth put back in that were originally taken out to assure passage. One such provision was an original ban on industry-wide bargaining by unions. The Byrd Amendment to T-H, already approved by the Senate and "requesting" Mr. Truman to use the act in the steel case, may be strengthened to spell out circumstances when T-H must be used.

To be kept in any new labor law will be Section 209 in T-H. That contains a provision which is the real reason why labor leaders are so vehemently against T-H. It provides that after the cooling-off period, National Labor Relations Board "shall take a secret ballot" of the union members on whether they approve or disapprove the last offer the employer made. Consensus among labor experts is that a secret vote among steelworkers would find them overwhelmingly in favor of the steel companies' last offer made early last week—16 cents an hour on wages and close to six cents an hour on fringes.

Union Shop — A study of the many union statements made in the seven-month-old steel case reveals organized labor's principal objectives for the future—and shows what you can expect in your labor-management relations. One major objective is the union shop. That's clearly shown in the steelworkers' stubborn stand for it.

On the surface, their stubbornness is surprising because in most plants the steelworkers have for all practical purposes the union shop anyway. But there's strategy in their stand, as a glance at the pictogram at top of p. 67 discloses. Union membership has shown a relative decline since 1945. Mr. Murray wants to set a precedent so other unions can win the union shop, too, and thus boost membership.

Right To Manage — A second long-term objective revealed by the steelworkers is more voice in management. Through so-called contract issues, the steelworkers seek to take away management's setting of incentive standards and other rights (see STEEL, Apr. 14, p. 65).

Last week, Mr. Murray had apparently retreated on this matter, although wording of the management clause was still undecided. Retreat or not, the objective remains and will be brought up in subsequent negotiations, probably by other unions.

Money Matters—The third big labor objective and the fifth implication of the steel case is in money matters. Although the steelworkers this time will settle on wage increases in the conventional manner, indications are from statements by union leaders and by the temper of the membership that a change in approach is in the works. Labor is going sour on pensions; inflation has negated some of the advantages. The membership is going sour on these yearly wage rounds. They see that they're practically no better off now than in 1945 although they're earning a lot more dollars. So, the new approach will probably be demands for the guaranteed annual wage, which was given a test run by the steelworkers and then quietly dropped. It may well be the issue in 1953, championed by some other CIO union, perhaps the United Auto Workers.

Still another implication may result from the steel wage controversy, but it's not yet clear that it has. Because of the handling of the steel controversy, have CIO members gone sour on their leadership?

Iron Ore Movement Stops

LAKE CARRIERS watched their chances for a 93-million-ton carrying season in 1952 fading rapidly last week as iron ore movement trickled to a stop. There was no strike as far as the carriers were concerned but they're bottled up on both ends of the shipping operation. A sympathy strike by iron ore miners and some dock workers with the CIO steelworkers quickly depleted stocks of ore at upper lake ports.

The loss in shipping tonnage of iron ore amounts to about 3 million tons a week. In the week ended June 2, lake carriers moved a 1952 high tonnage of 3,125,969 tons. In the week ended June 9, the tonnage moved dropped to 1,565,739 tons.

Steel plants still in operation were expected to have little difficulty obtaining enough iron ore to maintain production. Stocks of ore at furnaces on May 1 totaled 19,591,854 tons.

All Is Not Lost

All basic steel production is not being lost during the current strike by the United Steelworkers of America-CIO. Some 14 per cent of the annual ingot capacity of the steel industry is still in operation (see STEEL, June 9, p. 62, for the list of operating companies). In addition to the companies previously listed, Detroit Steel Corp., Detroit, has come to terms with the union which are close to WSB recommendations. Detroit Steel employs about 4500 workers and operates 10 open hearths with an annual capacity of steel for ingots and castings of 650,000 net tons.

Also not included in STEEL's June 9 listing of companies still operating were: Boiardi Steel Corp., Milton, Pa., with 2 electric furnaces, capacity 53,700 net tons annually; and Pacific States Steel Corp., Oakland, Calif., with 2 open-hearth and 4 electric furnaces, total capacity 232,000 net tons annually.

Steelworkers' Earnings Down

The estimated payroll of the iron and steel industry for April, 1952, was $225,568,000; less than any 30-day month since November, 1950. Interruptions resulting from the steel wage controversy also shaved April's average weekly hours worked and average payments to wage earners from recent

levels, says American Iron & Steel Institute.

Wage earners worked an average of 37.7 hours a week in April, three hours less than the 40.7 average in the first quarter, 1952.

Payments to wage earners averaged $1.938 an hour in April, 1.2 cents less than the average in the previous three months but 1.2 cents higher than in April, 1951.

Employment in April, estimated by the American Iron & Steel Institute at 669,660, was 2500 less than in March, 1952, but nearly 4000 higher than in April, 1951.

Ohio River Steel Corp. Sold

Louis Berkman Co., Steubenville, O., purchased for an undisclosed sum the Ohio River Steel Corp. at Toronto, O., a division of the Universal-American Corp., New York.

Ohio River Steel employs 800 persons and produces billets and blooms. It has four basic open hearths with annual capacity of 121,000 net tons of ingots. It also has capacity for 97,500 tons of forgings.

Until 1950 the plant was owned by Follansbee Steel Corp., Pittsburgh.

Pending a decision on future operating policy, the plant will be closed down, Mr. Berkman said. Several plans for use of the property are under consideration.

Oliver Bids for Ontario Ore

Oliver Iron Mining Division., Duluth, subsidiary of U. S. Steel Corp., has acquired options on 5400 acres of land near Simcoe, Ont., for investigation of possible iron ore deposits.

The company plans to drill through 3000 to 5000 feet of limestone to find the ore. If found in that location, it could be shipped easily to Port Ryerse, Ont., by direct rail connections, thence a short way across Lake Erie to Lorain, Cleveland or Conneaut, O. Drilling will start soon, but it may take months to determine the quality and extent of the ore deposits.

Jones and Laughlin Steel Corp. acquired similar options in southeast Ontario in April (STEEL, Apr. 21, p. 57).

Heat-Treating Is Stress-Relieving

This car-type heat-treating furnace was built by Waltz Furnace Co., Cincinnati, and installed in the Cincinnati Shaper Co. for stress-relieving treatment of all gears, castings and flame-cut pieces. Inside dimensions are 42 inches wide by 6 feet long. Heat from eight side burners ranges from 800°F to 1750°F

Modified Reg. "X": No Problem Solver

Relaxation of Regulation X won't give builders the middle-class home market they seek. Bankers, already holding down payments above regulation levels, won't change

CONSTRUCTION of birdhouses won't even benefit from the new relaxation of Regulation X so far as builders see now. Relaxation just doesn't hit the right spot.

Even if it did, banks generally will not lower their down payments to the new level because they had previously held higher than former Regulation X down payments anyway. The only push bankers see coming from the relaxation may be a boost in houses over the $25,000 mark where they are willing to make some concessions. Such houses are a far cry from the mass consumption item the builders seek.

Builders Boil—A glance at this table will show what the builders are up in arms about:

VALUE OF HOUSE	DOWN PAYMENTS Old Vet	Old Non-	New Vet	New Non-	Saving Vet	Saving Non-
$7000	$400	$1000	none	$350	$400	$650
$10,000	$600	$1500	$580	$1450	$20	$50
$12,000	$960	$2400	$900	$2350	$60	$50
$15,000	$3450	$4200	$2550	$3700	$900	$500

Except in a few areas, the house for $7000 or under is as *passe* as the $700 automobile. That rules off the lower end of the market. Upper end of the scale at $15,000 and higher is getting a little rich for the taste of the masses and is also ruled out as a fertile market.

In the area builders would most like to hit, the $10,000 to $12,000 slot, the down payment reduction to veterans and non-veterans alike is ludicrous. It amounts to virtually no reduction at all where housemakers say it is needed most.

Jaundiced Motives? — Builders are labeling the action as "appeasement" and "academic". They figure that the sole function of the action will be to ease pressure

on the government and distract Congress from an imminent complete removal of Regulation X.

Whatever the motive, the net effect of the relaxation won't shake any rafters—except possibly in a few hearing rooms. Builders intend to keep hammering for complete removal of the control. When it goes, they say, bankers won't be hard to woo into more mellow financing policies.

But right now, government action still keeps "X" the key quantity.

Prices Trimmed by GE

General Electric Co. made price cuts ranging from $10 to $27 on three of its 1952 model refrigerators. GE says the reductions were made to bring the models into better balance with the rest of the refrigerator industry's prices.

Bort Shortage Unplanned

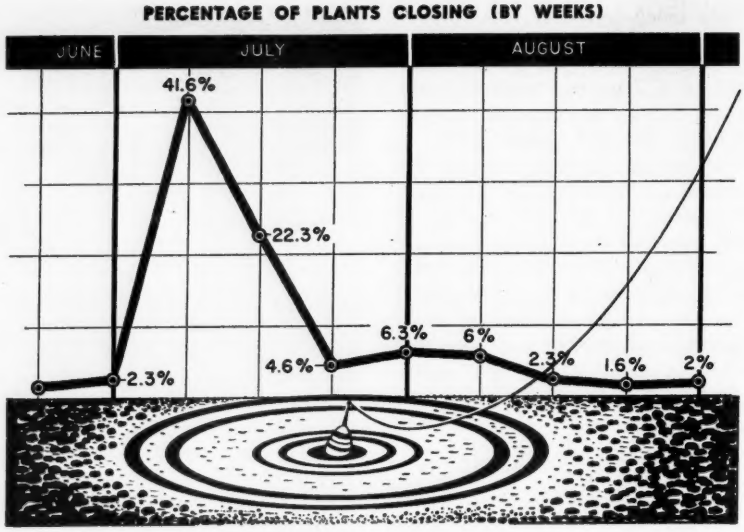
Rumors alleging a "planned shortage" of diamond powder for grinding wheels are untrue, says L. H. Metzger, president of Super-Cut Inc., speaking in behalf of Industrial Distributors Ltd., the world's largest distributor of industrial diamonds.

"Neither the higher prices nor the shortage of crushing bort—diamond powder—are intentional, and every effort possible is being made by Industrial Distributors and its producing affiliates to alleviate the shortage and reduce prices," says Mr. Metzger who has just returned from Johannesburg.

New Sources of Mica Sought

Lack of high-quality mica, required in production of electronic products and for the national stockpile, continues to be one of the difficult problems under the defense mobilization program, according to William A. White Sr., director, Miscellaneous Metals & Minerals Division, NPA.

The General Services Administration has launched a long-range purchasing program to enourage the discovery, development and production of mica. Goal of the program is 25,000 short tons of hand-cobbed mica by June 30, 1955.



Vacation Shutdowns: Peak Next Month

The fish peril is greatest first week in July as more plants close and more liberal vacation policies mark the vacation scene. Congestion problem may become acute this year

SUMMER HIATUS in metalworking activity as employees swamp resorts in quest of sunburn and mosquito bites will hit its peak the first week in July as usual. Rumors that the Independence week would lose popularity this year due to overcrowding of facilities did not materialize. (For the best time to stay off the roads, see chart above.)

But this year could do it. More plants which can close are closing, vacation policies are getting more liberal and resort operators figure the onslaught of men and women in sun glasses is going to be terrific. Employees may come back to their newly-painted plants complaining more about the congestion than the one that got away.

July Closings: Hot—The reason early July closings are going like a pinwheel is obvious: Plants find their customers and suppliers are closing so they follow suit. Advantages of the closing system for vacations seem to have been demonstrated during the past five years and the anticipated disadvantages failed to materialize.

Management finds the arrangement facilitates major maintenance work, eliminates complicated individual scheduling and rearrangement of work assignments and brings about a net gain in efficiency of the whole operation. An added advantage this year will be to conserve dwindling steel supplies. Employees, on the other hand, welcome a fixed and guaranteed vacation date not subject to change because of illness of other workers or changes in production schedules.

Some: Can't Close — Not all plants can close, of course, due to the nature of their operations or the fact that they supply customers who do not close. The percentage of plants closing in Detroit, for example, is smaller than in most areas because many of them supply the automakers who normally close only at model change time.

Plants with sustained operations, such as petroleum refineries, cannot close. Steel plants used to fit into this category, but there is an increasing tendency toward closing down the mills — particularly among the smaller independents. Double pay to workers during the "vacation" period is a factor and needed equipment repairs another.

Truckers: Profanity — Many plants closing down keep a skeleton crew to handle shipping and

receiving during the period. Those who do not are prolific in notifying their customers and suppliers of the event so that few non-vacationing truck drivers are driven to profanity being stuck with loads.

What will drive them to profanity on the highway is the increasingly liberal vacation policy coupled with the Independence week closing tendency described above. *More* workers are getting *more* time off besides getting it increasingly at the *same* time.

Vacations: Popular — Before Korea, most plants offered one week's vacation for one year and two weeks for five years and over. Although the Wage Stabilization Board has held the two-weeks-for-five-year standard tightly, it has permitted management to be pretty free below that level. Result: Contract negotiations during recent years have established an escalator program that works something like this — three days for six months; five days for one year; six days for two years, etc., up to ten days for five years. There are many variations on the theme.

Besides that, many large firms are adopting the practice of giving long service workers three weeks' vacation after a certain number of years on the job. The usual requirement is 15 years, though some plants peg it at 20 or 25 years.

The vacation picture has some interesting trends and . . . let's hope the fish are biting.

Trenton Steel Drops Loan Bid

Trenton Steel Corp., Detroit, has withdrawn its application to the Reconstruction Finance Corp. for a $50 million loan, according to Harry A. McDonald, RFC administrator. Trenton Steel had applied for a loan for working capital and for construction of a blast furnace, coke ovens and ore docks.

Work Starts on Seattle Mill

Foundation work is under way on a $500,000, 24-inch steel plate and billet mill at Seidelhuber Steel Rolling Mill Corp., Seattle. The firm's new electric steel melt plant has been in operation since January with ingot production converted at other finishing mills.

Navy R7V-1 Nears End of Line

Lockheed Aircraft Corp., Burbank, Calif., claims that the Navy R7V-1 Super Constellation transport will fly 370 mph, faster than any other U. S. transport plane. It can carry 106 passengers, 73 hospital patients or lift 17½ tons of freight. The plane shown in assembly line is the first of a large Navy order

Standards Make Progress

American Standards Association is host to International Organization for Standards

SUBSTANTIAL PROGRESS was reported in setting international standards for iron and steel hardness tests as technical committees began sessions at the second triennial General Assembly of the 33-nation International Organization for Standardization in New York last week.

Host for the two week conference is the American Standards Association, U. S. member of the non-governmental international standards body. Roger E. Gay, ASA president, welcomed 185 delegates from 25 foreign countries registered for the sessions.

Minor Differences—The iron and steel group, Technical Committee 17, dealt specifically with drafting standard practices for Rockwell, Brinnell and Vickers hardness testing.

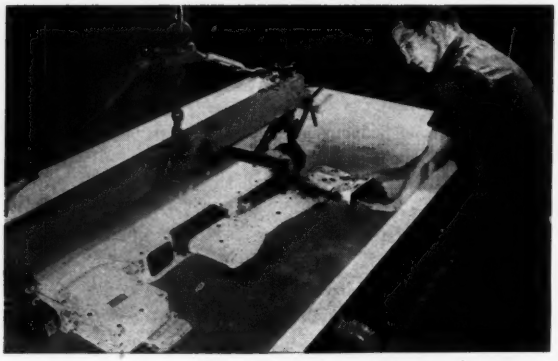
Of nearly three dozen paragraphs up for discussion on the first draft proposal, agreement was reached on about 90 per cent.

Main difficulties encountered were time of test and minimum radius of curved surface on which hardness tests can be made. Also on the committee's agenda were discussions of the Charpy and Izod impact tests and the Bend test.

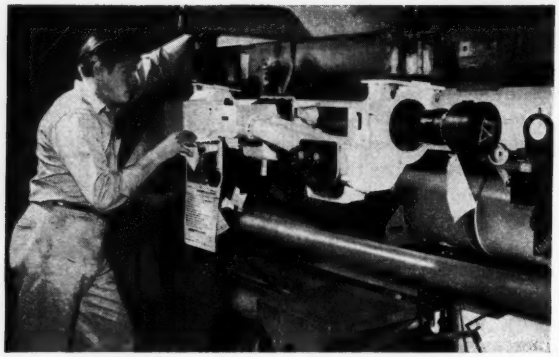
A Long Road—Ultimate goal of the group is to reach agreement on steel specifications. First it must reach agreement on how to express qualities. Various problems ahead will take years to solve, the committee believes, but encouragement is found in readiness to interchange information and to compromise on controversial points.

The U. S. is not a participating member of the iron and steel group. ASTE Committee E 1 did sit in as observer and took full part in the discussions. The Russian delegation was not in attendance at the iron and steel meeting, although it is a participating member.

On The Agenda—Other technical committees beginning sessions at varying times during the two-week conference include: Machine tools, ball and roller bearings, screw-threads, limits and fits, preferred numbers, marks indicating conformity with standards, petroleum products, textiles, mica, lac and cinematography.



T-41 RANGE FINDER UNDERGOES IMMERSION TEST
. . . nitrogen sealed inside offsets temperature changes



NEXT COMES THE RIGID OPTICAL CHECKUP
. . . specially trained "rangers" test accuracy of alignment

Army Reveals New Tank Gun Range Finder

SEVEN COMPANIES producing the T-41 tank gun range finder can take pride in the declaration of Col. William A. Call, officer in charge, Development & Engineering, Detroit Arsenal, that the device has made the M-47 tank on which it is installed an outstandingly potent weapon.

This range finder has been one of the big hush-hush components of the tank. Last week, though, in a tour of a General Motors' Ternstedt Division plant in Detroit, some of the manufacturing and assembly operations and some of the reasons for its superiority were bared.

Proud Producers—Ternstedt began parts manufacture in April, 1951. Its first completed units were produced last August. Three orders in addition to the first letter contract are now being finished. Chrysler Corp.'s Airtemp Division at Dayton, another prime contractor for the device, has had three contracts for the mechanism. The other producers are Eastman Kodak Co., Rochester; Arna Corp., Mergenthaler Linotype Co., and Otis Elevator Co., all of Brooklyn, N. Y.; and Northrup Aircraft Inc., Anaheim, Calif.

The "vision" of tanks has been notoriously poor, usually requiring aiming instructions from someone outside the tank or the firing of several bracketing rounds before the target could be zeroed in. The T-41 has changed that.

How It Works — Through its eyes, the target is sighted, tracked, and ranged as to its exact distance away. A scale visible to the gunner through his eyepieces tells him the target's range and notifies him of the kind of ammunition the range finder is set for. Its reticle provides a means of accurately correcting for any error in placement of the first shot if the target is missed.

As a stereoscopic range finder, in which the target is seen in three dimensions, the T-41 is a complex mechanism involving optical, electronic and mechanical systems. There are in all about 90 to 95 prisms and lenses in it and about 2300 separate metal parts. Steel and brass are used mainly for the gears.

By developing new machinery and techniques for turning out the complex parts, including certain non-circular gears, the General Motors division reduced the cost of the unit by more than 50 per cent since it began production.

Retools for Civilian Production

Hotpoint Inc. will start retooling for refrigerator production this fall its defense plant at Cicero, Ill. Pilot runs of refrigerators at the factory are slated for June, 1953.

The decision to switch over to civilian production was reached after the government's rescheduling of defense contracts slashed the plant's production of jet engine components for the Navy, says John C. Sharp, president.

The bulk of the factory's manufacturing space of 1 million square feet will be used for refrigerators, although the company plans to continue jet components production at the Cicero plant.

Meanwhile, Hotpoint announces it is shelving plans to build a refrigerator factory on a 400 acre site southwest of Chicago.

SELECTED DEFENSE CONTRACTS IN EXCESS OF $250,000

PRODUCT	CONTRACTOR
Milling Machines (3 Contracts)	Cincinnati Milling Machine Inc., Cincinnati
Machinery	Union Carbide & Carbon Corp., New York
Maxipresses	National Machinery Co., Tiffin, O.
Tractors, Warehouse	Crescent Truck Co., Lebanon, Pa.
Spare Parts	R. G. Le Tourneau Inc., Peoria, Ill.
	Caterpillar Tractor Co., Peoria, Ill.
Cranes, Truck (2 Contracts)	Bay City Shovels Inc., Bay City, Mich.
Aircraft Parts	Lear Inc., Grand Rapids, Mich.
Indicators	Weston Electrical Instrument Corp., Newark, N. J.
Generators	General Electric Co., Schenectady, N. Y.
Parts for Diesel Engines	Cooper-Bessemer Corp., Mt. Vernon, O.
Mortars, 81 mm	A. B. Farquhar Co., York, Pa.
Shells, 105 mm	J. B. Beaird Co., Shreveport, La.
	Rheem Mfg. Corp., New York
Shells, 76 mm	Fasco Industries Inc., Rochester, N. Y.
Fuzes	Eastman Kodak Co., Rochester, N. Y.
Fuzes, Bomb Tail	Westclox Div., General Time Instruments Corp., La Salle, Ill.
Range Finders	Northrop Aircraft Inc., Hawthorne, Calif.
Boosters	Webster, Warren & Co., Camden, N. J.
Cartridge Cases	Ekco Products Co., Baltimore
	Vulcan-Hart Mfg. Co., Baltimore
	Rheem Mfg. Co., New York
Metal Parts for Catapult	Century Engineering Corp., Cedar Rapids, Iowa
Radar Sets	Radiomarine Corp. of America, New York
Radiacmeters	Freed Radio Corp., New York
Teletypewriter Sets	Kleinschmidt Laboratories, Deerfield, Ill.
Electron Tubes	Raytheon Mfg. Co., Newton, Mass.

CHECKLIST ON CONTROLS

GOVERNMENT control orders are digested or listed each week in this "Checklist on Controls." For complete copies of NPA orders, Write to NPA Distribution Section, First Basement, New GAO Bldg., Washington 25. For copies of OPS orders, contact nearest OPS district or regional office. For copies of OPS news releases, write David S. Phillips, director, OPS Administrative Services Division, Temporary E Bldg., Washington 25.

Materials Orders

DISASTER AREAS—Amendment of June 4, 1952, of Direction 2 to NPA Order M-6A includes additional territory in the recently declared flood disaster areas that are entitled to additional controlled materials for rehabilitation. The amendment is aimed particularly at helping nine counties in Utah.

GRINDING WHEELS—Amendment of June 10, 1952, of NPA Order M-103 permits the manufacture of some very necessary shapes of diamond grinding wheels that had been prohibited by the order. The amendment was effective June 10.

Controlled Materials Plan

EMERGENCY STEEL—Direction 13 to CMP Regulation 1 is to channel into defense programs the steel production of mills in which there are no work stoppages. This will be accomplished by temporarily according special preference status at the mill level to authorized controlled material orders placed in support of certain military, atomic energy and machine tool programs. Such orders may be placed only by persons who are authorized to use designated program identifications and whose inventory on the date of placement of the order does not exceed a 45-day supply. Direction 13 was effective June 9.

NPA Regulation

MACHINERY — Interpretation 3 to NPA Regulation 2 covers the use of DO (defense order) ratings for the lease of machinery or equipment on a long-term basis where it is the custom of the manufacturer of the item not to sell it. A DO rating may be used to lease machinery or equipment if the item is leased from a manufacturer or through a manufacturer's wholly owned subsidiary, if the manufacturer does not sell but only leases such machines or equipment, and if the lease is a long-term arrangement in the nature of a permanent installation of the item. Interpretation 3 was issued June 10, 1952.

Price Regulation

SCRAP—Supplementary Regulation 1 to Ceiling Price Regulation 5 authorizes steel mills to pay not more than $1.50 a ton for someone else to receive, unload, store and reload iron and steel scrap for them during the steel strike.

Appointments in Washington

John C. Kinnear Sr., former vice president and director of Kennecott Copper Corp., was appointed United States representative to the Copper-Zinc-Lead-Committee, International Materials Conference. Mr. Kinnear will continue in his post as assistant to the director, Office of Defense Mobilization for metals and minerals.

Richards W. Cotton, assistant to the president, Philco Corp., Philadelphia, was named director of the Electronics Division, National Production Authority.

Ted E. McHold, an economist with NPA since March, 1951, was appointed director, Products Analysis Division, National Production Authority.

Dr. George E. Holbrook, assistant director of the development section, E. I. du Pont de Nemours & Co., Wilmington, Del., was named director of the Chemical Division, National Production Authority.

Philip J. Sandmaier, Republic Steel Corp., was appointed chairman, Production Directive Committee, Iron & Steel Division, National Production Authority.

E. F. Clark, Weirton Steel Co., was named chairman, Requirements Committee, Iron & Steel Division, National Production Authority.

John M. Price, chairman. Ferro Machine & Foundry Inc., Cleveland, was appointed chief, Castings & Forgings Section, Office of Price Stabilization.

Andrew H. Berding, formerly director of information, Mutual Security Agency, was appointed director of information, Defense Department.

Dr. Lloyd E. Swearingen, on leave as director University of Oklahoma Research Institute, and research professor of chemistry, University of Oklahoma, was made chairman of the new Army Research Committee.

Auto Wreckers Ask for Recision

Chances are good that NPA order M-92 will be revoked as recommended recently by the Auto Wreckers Industry Advisory Committee. M-92 requires inventory reports, limits the acceptance of used car deliveries and makes wreckers subject to allocation directives.

The AWIAC, representing the country's 25,000 auto wrecking yards, reported a rising flow of old used cars to wreckers' yards and estimated there are nearly 4 million cars and trucks on the road that could be scrapped. Wreckers are currently resisting premium prices being asked for unserviceable vehicles.

As of Mar. 30, 1952, scrap consumers had 4,528,635 gross tons of scrap on hand or 300,000 tons more than a month earlier, according to the U. S. Bureau of Mines. At the end of April, NPA says, 165 mills reported about a 60-day supply of scrap available compared to January when inventories were a low as three to five days.

Scarce Metals Listing Revised

Keeping pace with the improvement in raw material supplies, National Production Authority removed several metals from its list of scarce commodities which are subject to antihoarding controls of the Defense Production Act.

Metals which have been removed from the list include: All forms of antimony; bismuth; cadmium; all forms of lead; zinc-base alloy in crude form, zinc dust and oxide; all zinc products such as rolled and extruded shapes, wire and castings; zinc and zinc-base alloy scrap containing commercially recoverable zinc; zircon. The following have been added to the list of scarce metals and minerals: Cryolite, acid and ceramic grades of fluorspar, and rutile.

In designating materials as scarce, the President may prescribe conditions with respect to their accumulation in excess of reasonable demands of business, personal or home consumption. In the latest revision of Designation 1, such conditions are spelled out to cover imported material, receipts of minimum production or sales quantities and receipts of materials after adjustment.

Douglas Uses More Titanium

Titanium — industry's "wonder metal"—is finding more and more application in aircraft construction. Approximately 88 per cent of the skin on engine nacelles of the new DC-7 transport to be made by Douglas Aircraft Co., Inc., Santa Monica, Calif., will be of the new metal.

Titanium will also be used on the structural covering of the aft nacelles, some frames and the landing gear doors. Unalloyed titanium will also be substituted for the stainless steel currently used for firewall webs.

Ingalls Memorial

Mrs. Ellen Gregg Ingalls, chairman of the board of Ingalls Iron Works Co., Birmingham, Ala., received a memorial to her late husband, R. I. Ingalls Sr., from the First National Bank, Birmingham. Mr. Ingalls had served as a director of the bank in addition to guiding the Ingalls enterprises.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor*

General Services Administration bought its first machine tools since the pool order program was instituted in March, 1951. Significance: Soft spots ahead even for machine tools

SEVEN SMALL machine tools may herald the slowing of the machine tool market. They were bought from a New England manufacturer and represent the first tools the GSA is forced to purchase under the pool order program.

The GSA function was set up to assure manufacturers of long range markets and encourage full production. The government would buy only when no regular purchaser could be found.

At Cost—GSA paid 82½ per cent of the maker's regular selling price, an arrangement supposed to cover his actual cost.

Under the terms of the contract, he can repossess the tools and sell them to a user at the full price by reimbursing the government for the 82½ per cent outlay.

"That is what we hope he will do," a GSA spokesman told STEEL, "because the last thing the government wants is to accumulate tools under these contracts. The whole purpose of the pool orders is to encourage machine tool builders to maintain full production by providing a guaranteed market for the tools they cannot sell."

Slow Start—Initial pool contracts were unsatisfactory. Builders were not pleased with the Office of Price Stabilization's original formula for computing ceiling prices and they objected to the lack of provision for advance payments. Since the OPS came up last year with the present formula and since the GSA, last July, adopted the policy of making 30 per cent advance payments to pool contractors, the acceptance has been good as shown in the table.

The single pool contract shown canceled by the government was the highly-publicized deal with Fisher Body. Some of the 15 tenders shown rejected by builders are expected to be reopened and converted into contracts.

Fast Finish?—Tools involved in pool orders are those on the A list of NPA's Metalworking Equipment Division—the types and numbers of tools expected to be required for carrying out defense contracts. GSA expects that more tools will be turned over to the government as time goes on and requirements of defense contractors tend to be filled. The record should be something like that of World War II when the Reconstruction Finance Corp. laid out $26 million for tools under pool contracts and was stuck with about $3 million worth.

Leased Equipment Popular . . .

Many machine tool manufacturers are leasing government equipment for their plants. Seventy contracts, involving $30 million worth of equipment, have been arranged since this particular program was inaugurated last September. In most instances, the equipment goes into the plants of machine tool subcontractors. In all cases the tools are leased to the contractors, to be returned subsequently to the government. The tools are purchased and leased by the General Services Administration on recommendation of NPA.

Status of the Machine Tool Pool Program

Statistics on Machine Tool Pool Program, as of April 30 ,1952

	NUMBER	VALUE	NUMBER OF TOOLS INVOLVED
Contracts Tendered	136	$1,455,861,780	97,061
Contracts Accepted	106	1,134,540,279	77,371
Contracts Pending	14	212,412,058	16,314
Contracts Rejected	15	40,319,186	2,619
Contracts Canceled	1	68,590,257	757

Hardship Has Merits . . .

About 3500 companies—or 10 per cent of the approximately 35,000 which received copper, aluminum and/or steel allotments in the second quarter — curtailed their operations due to receiving less than their normal supplies. This list of 3500 hardship companies has been turned over to all government procurement officers with the request that they be given consideration in the placing of new government contracts, courtesy of NPA's Office of Small Business.

Worth Its Salt? . . .

A bill, authorizing an appropriation of $20 million for research to be conducted by the Secretary of the Interior in quest of a practical process for converting salt water into fresh water in order to augment the nation's water resources, has been passed by the House and awaits Senate action.

Apprenticeships Begging . . .

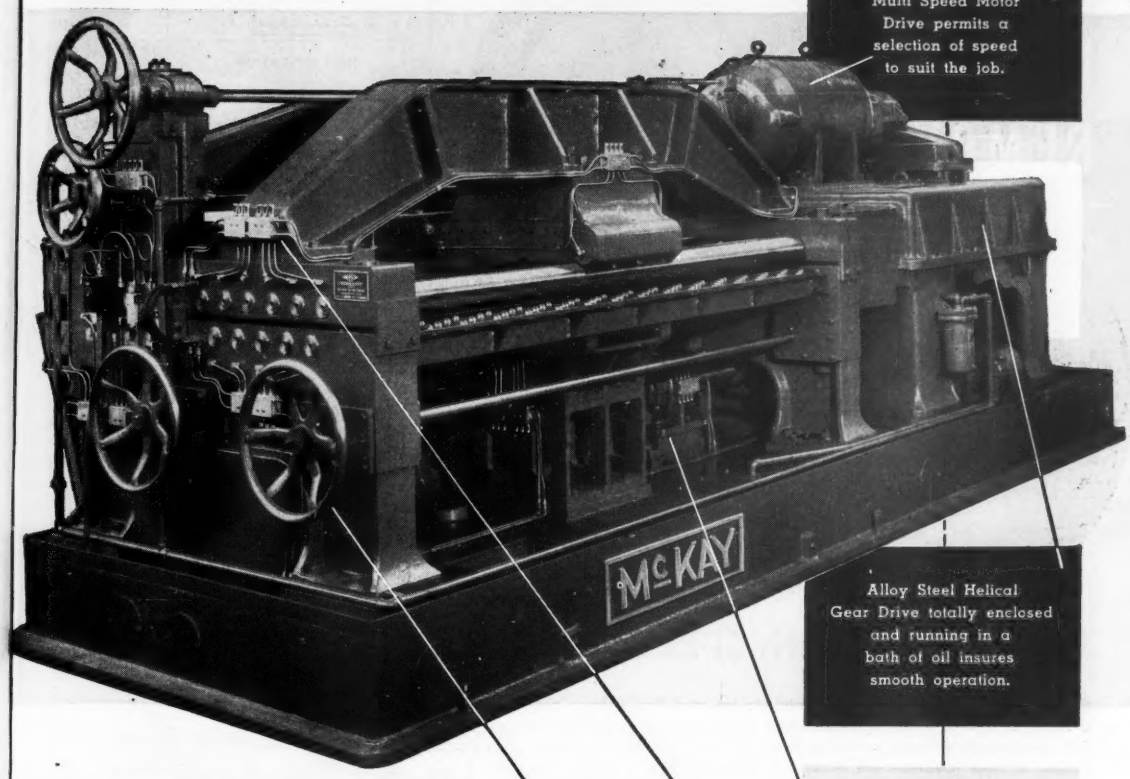
Labor Department's Bureau of Apprenticeship is disappointed over the small number of trainees in critical occupations. Registered apprentices in June of 1950, at the time of the Korean invasion, numbered 16,000. Now the total is only 20,000 despite intensive efforts to get the number increased further.

New moves are being planned; in particular, a campaign through local groups of foundrymen and local unions, to increase the number of skilled molders and coremakers. To help companies in amplifying their methods of training apprentices, the Defense Department is distributing price lists covering educational films obtainable from United World Films Inc., 1445 Park avenue, New York 29.

Hundreds of films made by the government during World War II to help train new workers in jobs entailing skill of specialized types were sold to United World Films as surplus. Many of them are just as timely today as when they were made.

why do McKay Machines

LAST LONGER ?



Multi Speed Motor Drive permits a selection of speed to suit the job.

Alloy Steel Helical Gear Drive totally enclosed and running in a bath of oil insures smooth operation.

Rugged construction consistent with steel mill design permits continuous operation with a minimum of down time.

One shot system provides correct lubrication for all moving parts.

Compact design with all adjustments easily accessible to the operator.

The McKay Flex Roll Sheet Processor is universally accepted by the automotive and stamping industries for eliminating stretcher strain and reducing scrap loss due to breakage in die drawn parts. The Processor combines a deep flex rolling under tension and a thorough cold working of the steel sheet by roller leveling, to condition it for deep drawing operations.

McK McKAY

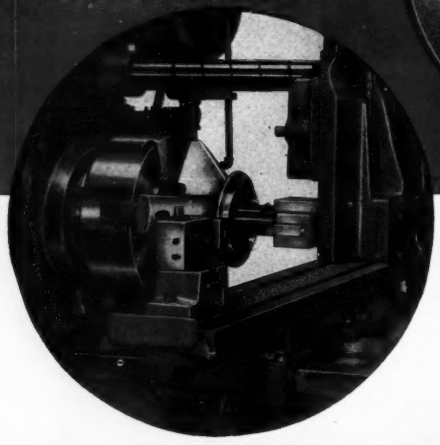
The McKAY MACHINE *Company*

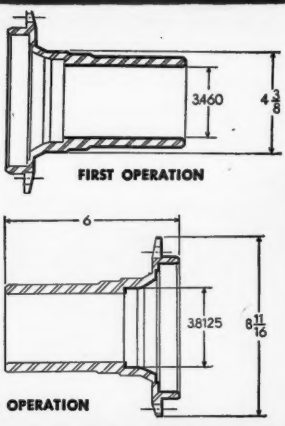
YOUNGSTOWN, OHIO

Engineers and Designers of Equipment for the Automotive, Fabricating and Steel Industries

ASSOCIATED WITH THE WEAN ENGINEERING CO., INC.

WHEN MACHINING OPERATIONS REQUIRE HEAVY METAL REMOVAL...





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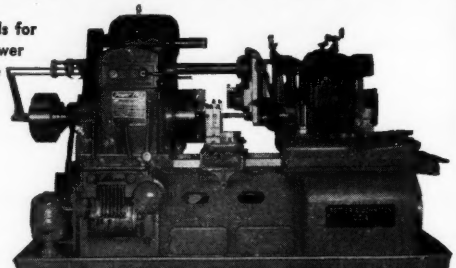

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Marshall Plan on Display

This United States Marshall Plan exhibit booth was one of many such displays at the 1952 International Fair in Copenhagen, Denmark. The exhibit shows modern and old methods of straightening copper tubing. The machine at right can straighten 45 tubes in 30 minutes while the hand method at left can do only 20. At the British Industries Fair, London, a record-breaking number of American buyers, 1150, brought U. S. representation near the top of the attendance list

IMC: Co-operative or Cartel?

With a flourish of statistics the Chamber of Commerce of the U. S. attacks the American share of IMC materials as unfair and tags the IMC itself as a cartel

GOVERNMENT CARTEL—that's the name the Chamber of Commerce of the U. S. has applied to the International Materials Conference, and the Defense Production Administration objects. Crux of the matter is whether IMC should, or has authority to, control the distribution of materials for other than defense production.

According to Webster's *New International Dictionary* a cartel is "a voluntary combination (usually international) of independent private enterprises supplying like commodities or services that agree to limit their competitive activities by allocating customers or markets or by other methods."

Without a Law—The chamber says in its article "IMC—Guns *and* Butter Cartel" that the IMC "operates without specific legislative authority in the U. S. However, all of its decisions are 'scrupulously' implemented by the DPA." Supposedly, America's share of the world supply recommended by IMC has in every case corresponded closely with the share the U. S. secured during the days of free competition. But, the article continues, "an examination of the facts will reveal that such is not the case under the criteria established by the IMC."

Allocations under the IMC are made on the basis of defense needs first, stockpiling for defense, second, and lastly, for civilian consumption on a basis prorated according to the traditional percentage "take" of the total supply by the country concerned.

Our Share of Defense—But we are obtaining approximately the same share of copper, for example, as we obtained in 1950 even though our needs have expanded. The chamber maintains our civilian economy is being reduced more drastically than the rest of the free world when taken into account is the fact that we are carrying by far the largest defense burden.

DPA and other government sources say American participation in IMC is under authority of the Defense Production Act, first, and under the authority of the President to conduct foreign affairs, second. The DPA's answer and objection to the "Cartel" article is the statement titled "U. S. Copper Shortage and IMC" in which the DPA says "The (copper) shortage occurred largely because U. S. production failed to meet expectations and partly because within the framework of the stabilization program, U. S. industrial buyers were unable to compete freely for high priced copper in the world market."

Not Necessarily So — While granting the technical truth of these words, the chamber directs attention to the phrase "within the framework of the stabilization program." It is manifestly clear, the group says, "that if American businessmen hadn't been restricted by United States government implementation of IMC policies, they would have gone into the world market and acquired the necessary amounts of copper to meet our production needs both for defense and civilian consumption."

Still objecting, NPA Administrator Henry Fowler attacked a proposed amendent of Sen. Homer Ferguson (Rep., Mich.) to the Defense Production Act which would deny the administration authority to restrict purchase of copper and other metals from foreign countries if domestic supplies of the metals are sufficient to meet the needs for defense, stockpiling and military assistance for foreign nations. Mr. Fowler said, "The inevitable result of the amendment, if passed, would be a disaster."

Our Share of Copper—The chamber concluded that if U. S. industry could obtain only a proportion of material according to what IMC says its criteria are (not to mention the freedom to purchase offered by the Ferguson amendment), it would mean an additional 5 to 6.5 percent of the world's total supply for this country.

That's equivalent to about 214,000 pounds of copper—enough to satisfy the requirements of the automotive industry for the metal for two years of normal production or enough copper for over 1.5 million residential homes.

MAJOR PROGRAM (as of April 15, 1952)	APPROVED No.	APPROVED Amount	APPROVED Per Cent of Total	PENDING No.	PENDING Amount	PENDING Per Cent of Total
IRON AND STEEL	804	3,642,080,000	19.8	233	572,395,000	7.3
RAILROADS, OTHER TRANSPORTATION	1,098	2,862,542,000	15.6	908	1,011,700,000	12.9
PUBLIC UTILITIES	348	2,523,966,000	13.7	167	865,864,000	11.0
ALUMINUM, OTHER NONFERROUS METALS	206	809,854,000	4.4	100	415,686,000	5.3
AIRCRAFT AND PARTS	849	802,926,000	4.4	366	138,412,000	1.8
IRON ORE MINING	96	708,160,000	3.8	20	237,597,000	3.0
MACHINERY (EXCEPT ELEC.), PARTS	1,309	554,551,000	3.0	674	194,000,000	2.5
ELECTRICAL MACHINERY, EQUIPMENT	519	304,380,000	1.7	298	99,468,000	1.3
ORDNANCE AND SUPPLIES	471	226,415,000	1.2	274	49,130,000	.6
NONFERROUS MINING	57	218,826,000	1.2	35	136,523,000	1.7
COAL AND COKE	67	209,375,000	1.1	33	89,506,000	1.1

Certificates of Necessity: Summing Up

Emphasis shifts from basic materials producers to public utilities; new plants are decentralized; and amortization has dropped 14 per cent from October to April

DECENTRALIZATION OF industry and a shift in emphasis from basic materials to public utilities highlight the granting of certificates of necessity.

Iron and steel, which in the early defense expansion days accounted for 70 per cent of the total value of the certificates issued, accounted for only 20 per cent from Feb. 25 to Apr. 15. Utilities, formerly less than 10 per cent, jumped to over 30 per cent during the period. Cumulatively, however, iron and steel are still the highest group.

"Space Defense" — More than four-fifths of all new defense plants and major industrial expansions for which rapid tax amortization was authorized during the first 18 months of the Korean war were located outside the "central cities" of industrial metropolitan areas. While industrial dispersion is the responsibility of business and industry, it was recommended by the National Securities Resources Board last summer and adopted by the President as national policy.

In a dispersion survey just finished, only projects valued at $1 million or more and which were "dispersible" were counted. Totaling $7.7 billion in value, the 900 plants qualifying were located as follows: Outside the industrial metropolitan areas, 46 per cent; in suburban sections of industrial metropolitan areas, 42 per cent; inside central cities, 12 per cent.

Despite the trend in plant construction, over half of the nation's defense production capacity is still located in 19 central cities.

Amortization Drops—The actual amount of tax amortization allowed in relation to the proposed investment has dropped over 14 per cent from Oct. 19 to Apr. 15 in line with DPA policy announced on the earlier date. The cut affected all percentage patterns except where decisions to the contrary had already been announced and lowered the cumulative percentage approved from 65.4 per cent to 58.8 per cent over the period.

The latest score shows accelerated amortization amounting to $19 billion has been approved for 10,622 new or expanded facilities to May 29. For totals to Apr. 15 of major industries see the table.

NPA Allots with Reservations

Barring difficulties induced by a prolonged steel strike, the chemicals industry will get the biggest chunk of third-quarter materials allotments for new projects, National Production Authority announced. The industry plans 165 new projects costing about $378 million.

Although initial expansions planned by the iron, steel and allied products category exceed chemicals in number, their value is only about $224.5 million. In all, 830 new requests worth over $1.34 billion were approved by NPA. The allotments, made before the steelworkers walked out, are subject to revision.

Because of the exhaustion of materials for industrial purposes in third quarter, 128 other projects were held over for future consideration. This compares with 1253 requests left at the post in second quarter.

The commercial backlog for third quarter is 550 applications compared with 2700 the last time.

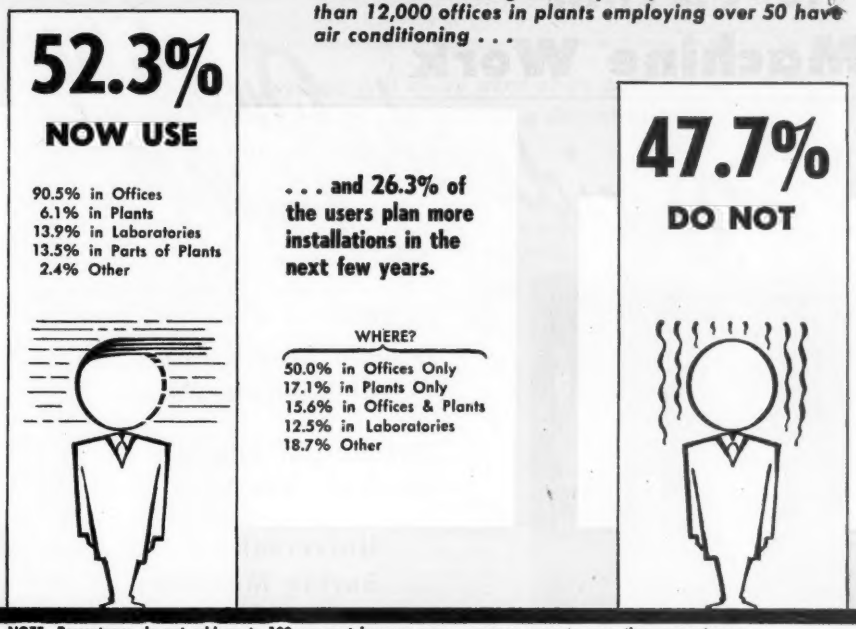
The list of total allotments, including both new and old projects, shows 1431 programs valued at about $6.54 billion. Iron, steel and allied products still lead that list in number and value.

Eaton Builds $8 Million Plant

Eaton Mfg. Co., Cleveland, is building a new $8 million plant at Marion, O., to be used for production of automotive parts and forgings. Construction of the building is expected to start in July of this year and be completed by May, 1953.

Air Conditioning Potential Is Great

In the metalworking industry only half of the more than 12,000 offices in plants employing over 50 have air conditioning . . .



NOTE: Percentages do not add up to 100 per cent because some responses were in more than one category

Metalworking Firms Condition Their Air

MANUFACTURERS of commercial-type air conditioning equipment have found a fertile market in the metalworking industry (STEEL, Mar. 10, p. 89). The pictograph above shows the extent of that market.

In a random-selection survey of 1500 of the industry's 12,624 firms employing 50 or more persons, STEEL found that 52.3 per cent of the companies now have air conditioning in offices or plants. Many of these companies are planning further installations, as are 19.4 per cent of those who are not yet using air conditioning.

Important—The survey reveals that in a majority of the cases the decision to install such equipment is made by the president, vice president, general manager or other top-level executives. The survey also indicates that the greatest benefits of conditioned air are increased efficiency and comfort of personnel, more production and less absenteeism.

Assuming that half of the 12,624 offices in the metalworking industry are now air conditioned, pictograph shows there remains a promising market for further installations. Add to that the approximately 9759 separate designing and/or drafting offices, the laboratories, assembling departments, foundries, production machining departments and many others where direct benefits of air conditioning can be determined and you get a ready market.

Forgers To Get Pricing Order

Aluminum and light metal forgers were briefed early this month on details of a tailored pricing regulation which is being prepared for their industry. At present, industry pricing is on a highly competitive basis, although a large percentage of its production is for aircraft and is exempt from price control. The industry is operating at 50 to 60 per cent of capacity.

The proposed regulation would cover the entire forgings industry, including aluminum, brass, drop, open die press and hammer forgings. It would be designed along the lines of the castings regulation, CPR 6Q, and the mechanical springs, metal stampings and screw machine products regulation, CPR 119. It would be a formula type of regulation using the industry's historical practice of determining price by relation to cost of labor, materials and other cost factors, and a producer's markup.

Representatives of the industry urge OPS to exempt firms whose sales are less than $100,000 a year from provisions of the regulation. They also suggest that a "short" order exemption of $1000 be provided. It was recommended that the regulation make provision for subcontracting costs and for increased costs due to the use of substitute or premium materials. One member of the industry recommends that cut-off date for determining labor and material costs be set as of Feb. 29, 1952.

Heavy Forge Plant Reactivated

The 35-acre government-owned plant at Eddystone, Pa., being reactivated by Heppenstall Co., Pittsburgh, is already committed to production of alloy steel die blocks for the Air Force heavy press and hammer program. Heppenstall says production will begin on die blocks up to a maximum size of about 16 tons each, but the Eddystone plant may be expanded to produce even larger die blocks.

Objective of the Air Force heavy press and hammer program: To forge large structural members of aircraft in one piece instead of in smaller pieces that have to be bolted, riveted, or welded together.

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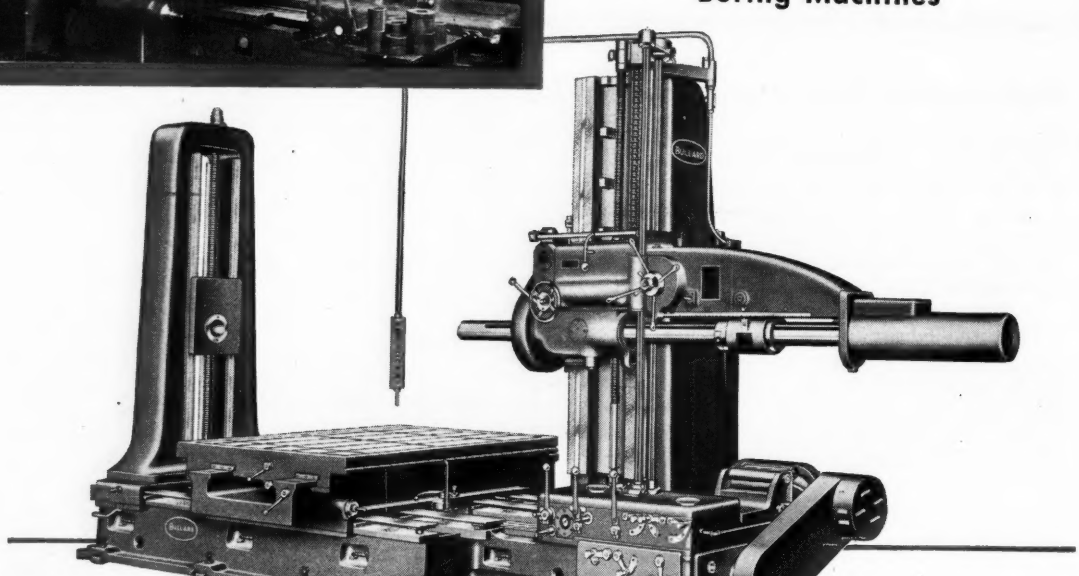

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By H. C. TUTTLE *Detroit Editor*

Mirrors of Motordom

GM's Fisher Body Division will move most of its purchasing department to Cleveland as one move in a decentralization program. The shift starts by September

DETROIT

CLEVELAND is to become the center of purchasing activity for Fisher Body Division of General Motor Corp. as one move in a far-reaching decentralization program now beginning to take shape.

The news that Fisher is moving its Purchasing Division to the Forest City electrified Fisher p.a.'s and follow-up men exactly as it did the flock of manufacturers' agents and company representatives who depend so heavily on its business.

Things To Come—Many decisions concerning the move and spread-out of buying activity have not yet been made. But several of the most important ones apparently now settled make the plan shape up about like this:

Fisher's director of purchases and a few key policy makers on his staff will remain in Detroit, headquartering in the General Motors building the present site.

Purchasing Division will locate in Cleveland, to take charge of all buying of several important groups of components and materials—including, it is understood, glass, standard parts (automakers' parlance for fasteners), rubber.

A steel buyer will operate at each fabricating plant to do his own scheduling and follow-up under the policy and control establishment to be maintained in Detroit office. There are at the present time Fisher fabricating plants in Flint, Pontiac, Grand Rapids, Cleveland, Hamilton, and Pittsburgh.

Pontiac is reportedly to become headquarters for all purchasing of automotive trim fabric.

Not Fully Confirmed—That the planning has advanced to this stage is not confirmed. The only part of the foregoing program which Fisher Body officials will admit has been decided upon is that pertaining to steel purchasing. Jesse B. Hildebrand, general purchasing director, states only that steel buying will be done on the plant level, first at Cleveland, subsequently at the other fabricating plants of the division.

Auto, Truck Output

U. S. and Canada

	1952	1951
January	409,406	645,688
February	467,692	658,918
March	517,206	792,550
April	576,504	680,281
May	542,075*	695,898
June		653,682
July		522,858
August		571,442
September		505,758
October		558,971
November		480,199
December		402,729
Total		7,179,161

Week Ended	1952	1951
May 10	130,509	180,577
May 17	129,914	156,127
May 24	127,723	158,259
May 31	104,892	121,476
June 7	131,409	152,656
June 14	132,000*	157,026

Sources: Automotive Manufacturers Association, Ward's Automotive Reports. *Preliminary.

Important parts of this program will become effective by September, but it is the considered view of important suppliers to the division that it will require two years or so to get the plan functioning smoothly.

Why?—In offices where the news had penetrated last week there was bewilderment over the reason for the change. Fisher men, most of whom were as startled and uncertain over its meaning and implications as the vendors, used the word "efficiency" but were at a loss as to why it is more efficient to centralize buying in Cleveland than in Detroit.

In the case of steel, the explanation is officially offered that it will save time and expense in the follow-up phase of procurement to have the men in close proximity to the fabricating plants. The unofficial view in steel circles is that f.o.b. pricing is the basic cause for the change. Each buyer, it is thought, would work with mills in his area with little regard to those at a freight rate disadvantage.

Not Clear—Where freight costs are of lesser importance, as appears to be the case of those materials to be purchased by the buying unit to headquarter in Cleveland, Fisher officials declined last week to comment on why the move is being planned.

Fisher's Central Works Engineering will not be involved in the change, but it is understood that liaison engineers will have to be on hand or on the purchasing agent's call to enable sound decisions to be made by the Cleveland buying organization.

Transfer—At Fisher Body's end the move would seem to involve a fairly small group. Regarded by vendors as an extremely efficient organization, Fisher is said to have only about 14 senior buyers, most of whom it is thought likely will be transferred to Cleveland.

The real physical problem is that which vendors will have to figure out in the next few months. To establish Cleveland offices or not is the question. Few are in the position of being able to move their organizations lock, stock and barrel to that city—they do too much business with other Detroit automakers. And few want to see their Cleveland representatives take over business they nurtured.

Aid to Cleveland—It is regarded as sure-fire that Cleveland industries will profit from the switch. Some, it is felt, will be better off because of their proximity to the buyers, and will take more than their already great interest in the automaking industry. There are other companies which will benefit if any considerable number of vendors' representatives move to Cleveland. In this group are such service companies as those which perform intermediate operations such as heat-treating and plating. It has worked out in the past that

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some vendors not located in Detroit but which have representatives here ship their products to the Detroit area for these operations before reshipment to the consuming plants. This devious procedure is followed because of the contacts their Detroit men have and because of their ability to oversee quality. New and closer sources may be established when vendors in this group become familiar with Cleveland area facilities.

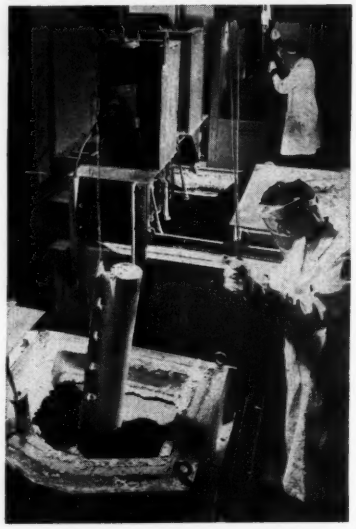
Fisher Body's move was not dreamed up overnight. It was scheduled for immediately after the war, but hectic conditions, procurementwise, made it advisable to hold off until now. In the talk stage is a similar shift and decentralization of Ford Motor Co. purchasing. But this, it is now believed, will not be on the grand scale of Fisher Body's.

Payoff in Bonding

Six year's research into the knotty problem of developing a practical and inexpensive method of coating steel and nonferrous metals with aluminum has reached the payoff point. General Motors Research Laboratories Division has perfected the technique, and has installed a pilot production line at its Metallurgy Building at the GM Technical Center for making aluminum coated fabricated steel manifolds for GM's Detroit Diesel Engine Division. Another pilot line is in operation at Harrison Radiator Division, coating heat exchangers.

The process, known as "Aldip," appears to have a bright future in two directions—as a corrosion resistant coating, where indications are it may replace galvanized steel in some applications, and as a heat resistant material after the coating is diffused by heat treatment. In the latter instance, it bids to take over in certain places where high temperatures are present, replacing high alloy materials.

Used hot on individual fabrications or castings, it could be installed as a continuous process for coating sheet, wire or rod, according to the GM research men who know it well. Only a rough survey had been conducted, they say, on its potential applications. In the automotive field tests are



DIPPED IN ALUMINUM
. . . GM solves coating problem

under way with muffler inner tube assemblies and exhaust tail pipes, both now corrosion-susceptible. Other likely applications are for steel fixtures and parts handling equipment where intense heat or acids may be present.

As used on heat exchangers, Aldip process in essence consists of these initial steps: Parts are dipped in an alkaline cleaner, washed in hot water, given an acid pickle then two water rinses then dried in a furnace.

After that they are immersed for about four minutes in a preheating salt bath where the temperature is maintained at about 1300-1325 degrees F. This serves the purpose of bringing the parts up to heat and fluxing them for the dip into the molten aluminum.

In this process, which takes from 30 seconds to a minute, the aluminum bath is covered with the molten salt flux. While the parts are red hot, they are returned to the preheat salt bath and then withdrawn.

During the aircooling, they assume a silvery cast as the Aldip skin cools. Inside and outside of parts are completely coated in the process. Excess aluminum is removed by airblasting.

The bond between the aluminum outside coating and the base metal if steel is used is an iron-aluminum alloy which makes the coating and base inseparable.

Shifts at Packard

First publicly-known action of James J. Nance since taking over as Packard president was to announce the resignation of former president High J. Ferry as treasurer. Mr. Ferry continues as chairman. To succeed Mr. Ferry, Walter R. Grant is named financial vice president and treasurer. Fred J. Walters has been elected vice president and assistant to the president. Both men occupied similar positions at Hotpoint when Mr. Nance was there. Mr. Walters had been with Cadillac and Oldsmobile Divisions of General Motors in sales positions.

In middle echelon executive positions, a few other Hotpoint men have also been brought into the Packard organization, although announcements to this effect have not yet been made. In auto circles, it is believed that a new team is in the making.

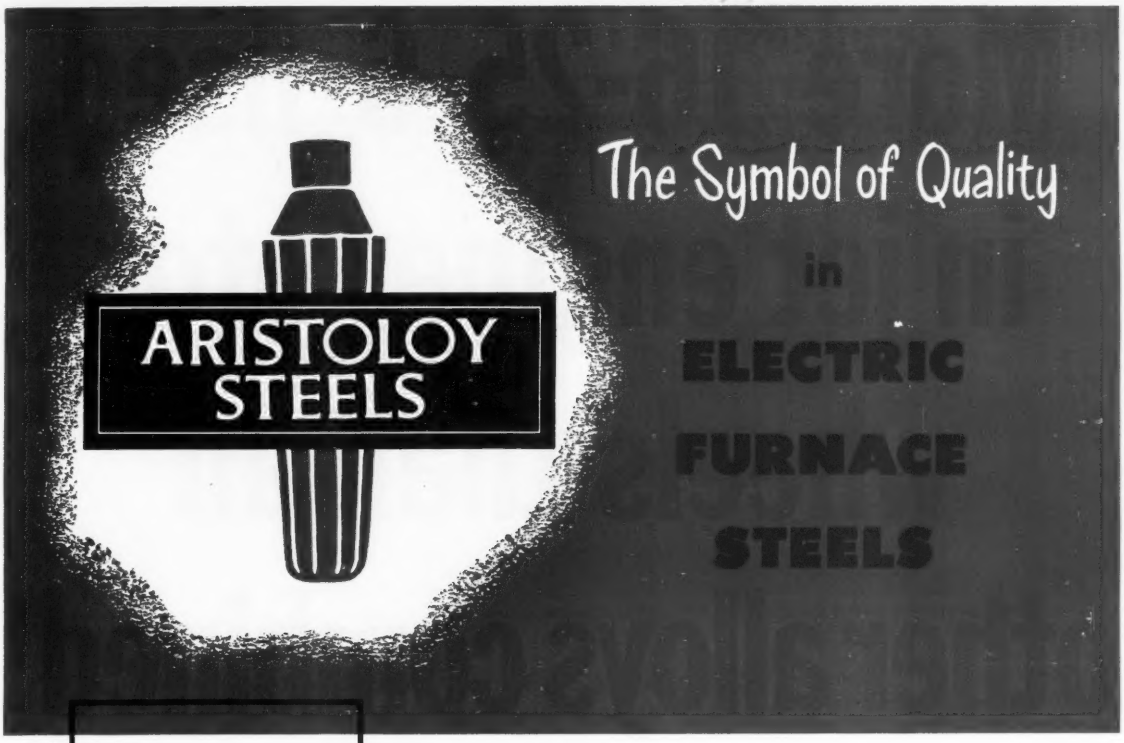
Mr. Nance has been elected a director of the Automobile Manufacturers Association, filling Mr. Ferry's unexpired term. A. E. Barit, president, Hudson Motor Car Co., has been elected treasurer of AMA, succeeding Mr. Ferry.

K-F Separates Activities

A split-up between its automobile and aircraft manufacturing activities has been announced by Kaiser-Frazer Corp., with separate divisions established for each. Airplane & Airframe Division will be headed by S. A. Girard, who has been vice president in charge of operations. T. A. Bedford, formerly vice president in charge of manufacturing, will be in charge of automotive and aircraft engine projects, as vice president.

Power Steering Grows Popular

Popularity of power steering is dictating that it be made available on some of the less luxurious models. Buick this month will begin to offer its booster unit as an extra cost option on Supers. It has been available up to now only on Roadmasters, but has caught on to such an extent that the percentage of cars sold in this series which are equipped with the unit more than doubled between April and May, reaching 65 per cent.



Hot Rolled
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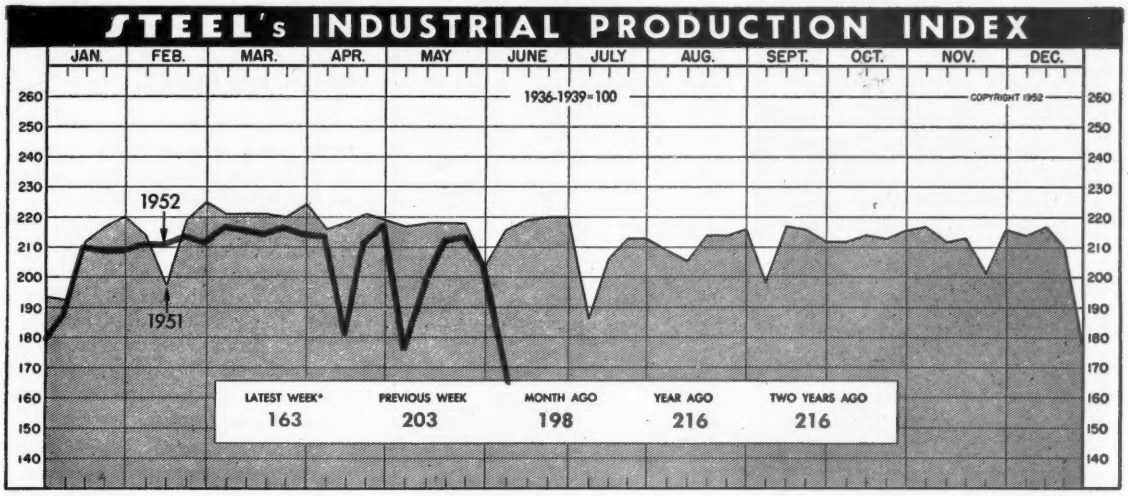
YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1936-1939=100
COPYRIGHT 1952
260 250 240 230 220 210 200 190 180 170 160 150 140
1952
1951
LATEST WEEK* 163
PREVIOUS WEEK 203
MONTH AGO 198
YEAR AGO 216
TWO YEARS AGO 216

Week ended June 7

Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.

Plunge in industrial production index reflects steelworkers' strike. Outlook is for warmer business competition and cooler demand in the summer months

WARM COMPETITION and cool demand may best describe the business outlook for the summer months ahead.

Gap—Right now, most business activities—bolstered by defense—continue to move sidewise slightly under the year-ago levels. Military orders are expected to roll in faster as the stretch-out nears its yearend peak. But the gap between civilian goods production and lowered consumer demand is taking much of the optimism out of economic forecasts. While factory sales of certain heavy durables (ranges, refrigerators) have recently risen somewhat, these increases may indicate a slight upward adjustment only.

Ironically, a number of executives in the consumer durables industries were clamoring for substantial increases in materials allotments at the start of the year. It is now apparent that a good number of these companies are far from using up their second-quarter steel, aluminum and copper rations. Reports of production cutbacks by civilian durables producers continue to appear.

One point is almost unanimously agreed on: Prices will have to continue to drift downward before the consumer starts spending in his former manner. Looking toward another nationwide flare-up of wage demands and perhaps a rise in costs, many manufacturers may find it impossible to slash prices much further.

Index—Reflecting the drop in steel production by the third industry walkout, STEEL's industrial activity index tumbled to 163 per cent of the 1936-1939 average in the week ended June 7. That's 40 percentage points under the previous week and 50 points under the mark for the week ended May 24—the last full week before the Memorial Day holiday. Steel production dropped from 102.5 per cent of capacity in the week ended May 31 to 37.5 per cent in the week ended June 7. Car loadings and electric power generation in the week ended June 7 showed slight increases.

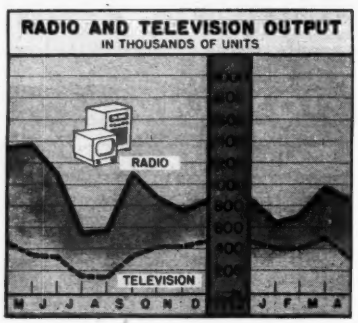
Auto Output Firm . . .

Taking advantage of the year's best selling period, the auto industry plans fairly high production throughout June. With U. S. passenger car assemblies for the year totaling 1,874,897 units by June 7, the industry expected to pass the 2-million unit mark on June 23. In 1951, this milestone was reached seven weeks earlier, at the end of April.

Despite threats of shortages brought on by the steel strike, the auto industry snapped back to high weekly production after the Memorial Day weekend. U. S. and Canadian plants turned out 131,409 autos and trucks in the week ended June 7, estimated *Ward's Automotive Reports*. That's an increase of 26,517 units over the previous week's production, and 4136 autos and trucks over output in the week ended May 24, the last five-day week. In the first five months of 1952, combined U. S. and Canadian output reached 2,516,171 autos and trucks, compared with 3,487,542 units produced by the two nations in the same months in 1951.

Steel Output Falls . . .

The steel strike cut the nation's output of steel for ingots and castings to 259,000 net tons in the week ended June 14, the American Iron & Steel Institute estimated. That's a drop of 545,000 net tons from the previous week's output

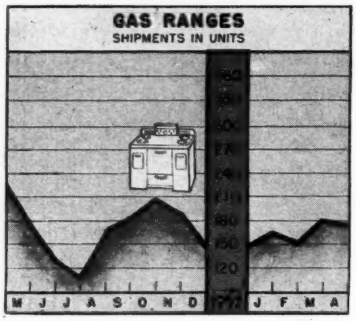


Radio and Television Output

Thousands of Units

	Radio		Television	
	1952	1951	1952	1951
Jan.	632	1,203	405	646
Feb.	759	1,313	409	679
Mar	976	1,720	511	875
Apr.	848	1,337	323	469
May	...	1,373	...	339
June	...	1,083	...	327
July	...	548	...	152
Aug.	...	563	...	147
Sept.	...	1,100	...	337
Oct.	...	875	...	412
Nov.	...	748	...	415
Dec.	...	851	...	469
Total	...	12,714	...	5,267

Radio-Television Mfrs. Assn.

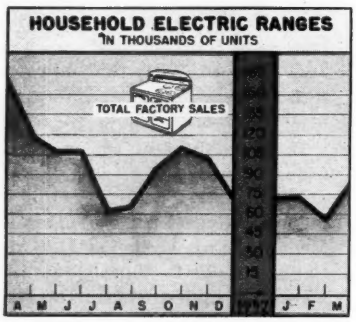


Gas Ranges

Shipment in Units

	1952	1951	1950
Jan.	166,100	260,600	165,000
Feb.	150,400	254,000	209,000
Mar.	180,100	289,800	264,000
Apr.	173,600	225,000	239,100
May	.....	177,800	242,800
June	.....	128,500	217,000
July	.....	116,400	254,800
Aug.	.....	168,100	331,500
Sept.	.....	183,600	287,000
Oct.	.....	210,900	308,000
Nov.	.....	192,200	269,100
Dec.	.....	145,800	235,900
Total	.....	2,348,900	3,023,200

Gas Appliance Mfrs. Assn.

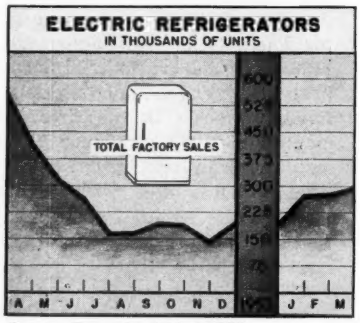


Household Electric Ranges

Total Factory Sales—Units

	1952	1951	1950
Jan.	72,830	130,316	97,925
Feb.	55,728	121,585	118,989
Mar.	83,485	159,865	145,417
Apr.	.....	118,823	132,859
May	.....	106,685	145,498
June	.....	106,589	158,534
July	.....	60,530	130,505
Aug.	.....	64,042	132,243
Sept.	.....	93,551	156,216
Oct.	.....	109,043	130,452
Nov.	.....	101,476	129,384
Dec.	.....	72,140	124,360
Total	.....	1,244,645	1,602,382

National Electrical Mfrs. Assn.



Electric Refrigerators

Total Factory Sales—Units

	1952	1951	1950
Jan.	275,297	465,903	375,856
Feb.	277,986	403,035	461,256
Mar.	298,092	558,503	586,293
Apr.	.....	409,887	546,279
May	.....	309,722	542,865
June	.....	261,298	549,740
July	.....	163,922	507,029
Aug.	.....	165,309	518,359
Sept.	.....	193,929	535,002
Oct.	.....	191,519	420,431
Nov.	.....	147,394	411,201
Dec.	.....	195,403	394,268
Total	.....	3,465,824	5,848,579

National Electrical Mfrs. Assn.

Charts—Copyright 1951, STEEL

Issue Dates on other FACTS and FIGURES Published by STEEL

Construction .....June 9	Gear Sales .....May 26	Pumps .....May 12
Durable Goods ....May 5	Gray Iron Castings.June 2	Steel Castings .....June 2
Employ., Metalwkg.Apr. 21	Indus. Production ..May 26	Steel Forgings .....June 9
Employ., Steel ....Apr. 28	Ironers .....May 12	Steel Shipments ...Apr. 21
Fab. Struc. Steel ..June 9	Machine Tools .....June 2	Vacuum Cleaners ..May 5
Freight Cars .....May 26	Malleable Castings .June 2	Wages, Metalwkg. .May 5
Foundry Equip. ...June 9	Prices, Consumer ..May 19	Washers .....May 12
Furnaces, Indus. ..May 26	Prices, Wholesale ..May 19	Water Heaters ....May 19

and 1,832,000 net tons below production in the week ended May 31. One month previously, U. S. plants turned out a weekly production of 2,102,000 net tons ingots and steel for castings.

Factory Jobs Down . . .

Slackened sales and rising inventories in a wide range of consumer goods industries are blamed as layoffs of factory workers increased slightly during March and April. The range reached 13 per 1000 employees in April as compared with the record postwar peak of 17 per 1000 set during November, 1951. Marked increases occurred in apparel, chemicals, transportation equipment and paper industry groups.

Agriculture and construction employment continued its usual seasonal upward trend, however, and the boost was sufficient to offset factory layoffs and raise the general employment level higher than any other May figure on record.

Coal Stocks Tower . . .

While John L. Lewis is waiting to see what the steelworkers get, stocks of bituminous coal are piling higher. Bituminous stocks hit a nine-year peak with a total of 78,132,000 net tons on May 1, according to the Bureau of Mines. This is the largest stockpile since July 1, 1943, when 79,525,000 net tons were held by industrial users and retailers. Compared with May 1, 1951, industrial stocks were higher by 8.9 per cent on May 1, 1952.

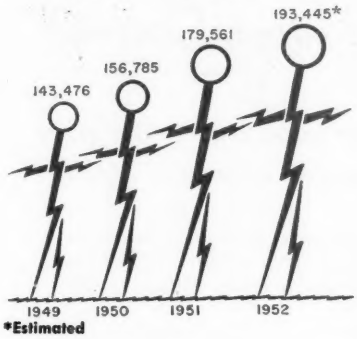
At the rate consumption on May 1, enough bituminous was stockpiled to last 72 days, compared with a 61 day supply on Apr. 1, and 60 days on May 1, 1951.

Freight Cars Braked . . .

Deliveries of new domestic freight cars in May totaled 6,857 units, a decline of 546 units from April and 2915 under deliveries in May, 1951. Orders for new freight cars totaled 2502 units compared with 397 ordered in April and 4919 in May, 1951. Order backlogs stood at 103,910 cars in May, compared with 108,270 in the previous

More Charge in Generation

Power Generation, Million of Kwhrs (first six months of years)



*Estimated

month and 150,628 in the same month, 1951.

Construction Lags . . .

Due in part to the Memorial Day holiday, contract awards for heavy construction amounted to only $225.9 million for the week ended June 5, says *Engineering News-Record*. This total was 11 per cent under the average week to date.

Awards for mass private housing added up to $61.8 million, 8 per cent above the average week to date. Contracts for public buildings amounted to $43.2 million, 28 per cent above the average weekly total. Highway construction awards totaled $38.5 million, 40 per cent over the average weekly totals.

New Firms Edge Up . . .

New businesses increased slightly in April to 8284 stock corporations, 4.8 per cent over March, says Dun & Bradstreet Inc. In the first four months of 1952, new firms chartered totaled 31,681. This is a rise of 4.2 per cent above the 30,407 of a year ago and 8.6 per cent above the aggregate of new business incorporations in the first four months of 1950.

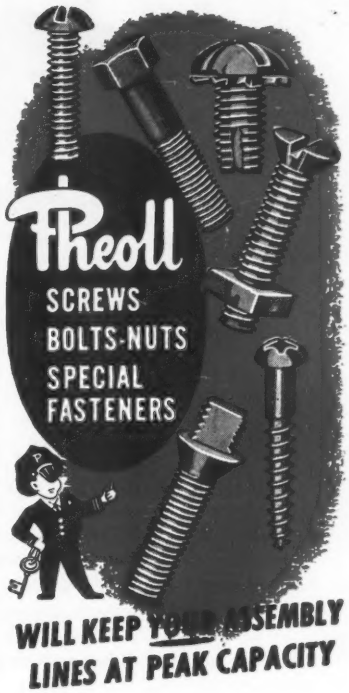
Trends Fore and Aft . . .

Net income of Class I railroads totaled $45 million in April, $1 million under income in April, 1951 . . . Repayments on loans by manufacturers of metals and metal products declined $2 million in the week ended May 28. These companies repaid $1020 million since Dec. 26, 1951. . . "Consumer debt is being ballyhooed to the point where many families have loaded up with televisions, radios and electrical appliances of all kinds, because not to do so has even been stigmatized as a sign of failure"—J. L. Robertson, member of the Board of Governors, Federal Reserve System.

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Output (per cent of capacity)[2]	37.5	102.5	103.0
Electric Power Distributed (million kwhr)	7,005	6,811	6,734
Bituminous Coal Output (daily av.—1000 tons)	1,397	1,497	1,444
Petroleum Production (daily av.—1000 bbl)	N.A.	N.A.	4,168
Construction Volume (ENR—millions)	$226.0	$307.8	$296.0
Automobile, Truck Output (Ward's—units)	131,409	104,892	152,656
TRADE			
Freight Car Loadings (unit—1000 cars)	740[1]	697	813
Business Failures (Dun & Bradstreet, number)	120	136	172
Currency in Circulation (millions)[3]	$28,842	$28,710	$27,520
Dept. Store Sales (changes from year ago)[3]	N.A.	+4%	0%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$14,788	$16,579	$17,050
Federal Gross Debt (billions)	$260.0	$258.3	$255.1
Bond Volume, NYSE (millions)	$14.5	$9.3	$13.1
Stocks Sales, NYSE (thousands of shares)	6,266	4,098	5,829
Loans and Investments (billions)[4]	$73.9	$73.4	$69.4
United States Gov't. Obligations Held (billions)[4]	$31.8	$31.6	$30.4
PRICES			
STEEL's Weighted Finished Steel Price Index[5]	171.92	171.92	171.92
STEEL's Nonferrous Metal Price Index[6]	223.7	232.4	241.1
All Commodities[7]	111.9	112.0	115.0
All Commodities Other Than Farm and Foods	112.8	113.1	116.6

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1951, 1,999,035; 1952, 2,077,040. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100. [8]Not available.



WILL KEEP YOUR ASSEMBLY LINES AT PEAK CAPACITY

Whatever you manufacture or assemble, you can speed production and improve your product by using Pheoll screws, bolts and nuts. These industrial fasteners drive easy and straight, and will not bind because threads are accurately rolled or machined. Precision-made screw and bolt heads, slots and head recesses prevent wrench and driver slippage. Count, too, the added bonus you receive by using fasteners that improve product appearance.

An interesting story on standard and special industrial fasteners and their profitable applications to your needs may be obtained from experienced Pheoll engineers. Ask these men to recommend screws, bolts and nuts that will increase your overall profits on assembly line work.

these Pheoll products prevent production lag
Tapping Screws • Cap Screws • Sems
• Phillips Recessed Head Screws and Bolts
Machine Screws • Special Fasteners
Thread Cutting Screws
Pheoll
MANUFACTURING COMPANY
3700 ROOSEVELT ROAD
CHICAGO 50, ILLINOIS
SCREWS • BOLTS • NUTS

TINNERMAN

Speed Nut Savings Stories

The Glenn L. Martin Company leads the way to...

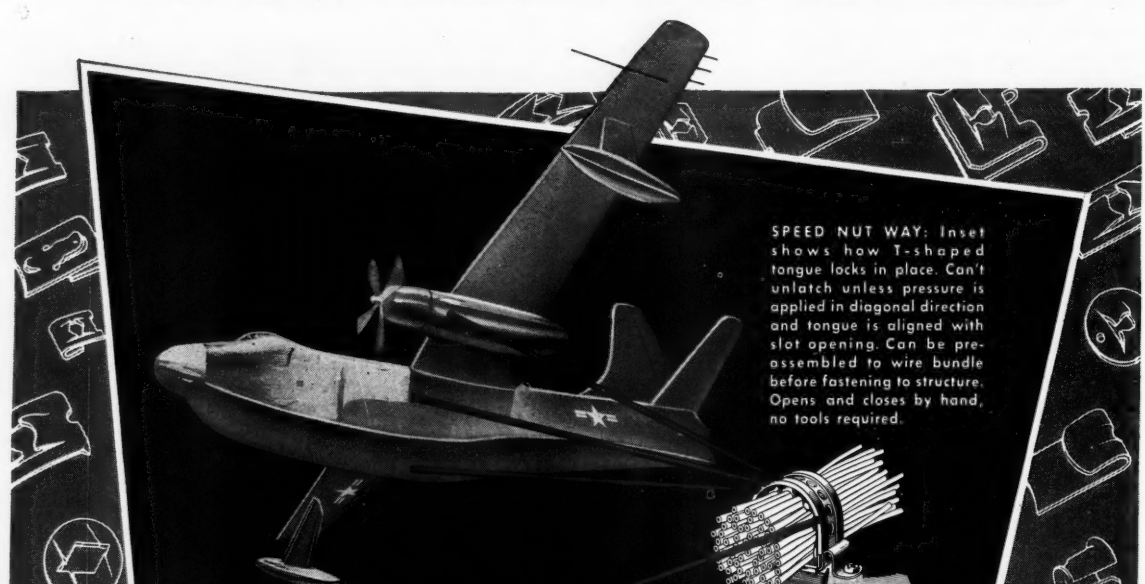
Multi-Million Dollar Savings

...FOR THE AIRCRAFT INDUSTRY WITH NEW TINNERMAN ELECTRICAL HARNESS CLAMP!

The new TINNERMAN Electrical Harness Clamp "takes off" on really big-money savings for the Glenn L. Martin Company, builder of the famous Martin Bombers. Aircraft designers and engineers at Martin found that in a quantity such as 1000 planes, a savings of $270,000 could be made... or 18 cents per clamp over former methods for 1500 clamp installations in the new Martin P5M-1 Marlin! Think of this tremendous savings in terms of the thousands of aircraft on order for building America's defenses—and you see how "multi-million-dollar savings" can be made for conversion into even greater production!

Tinnerman engineering reports this significant savings story to all American industry as another example of Tinnerman teamwork! For better fastening analysis and engineering know-how... for significant production savings no matter what your fastening problem, turn to TINNERMAN! There's a Tinnerman representative in your area to give you competent help... he'll be happy to supply details for a FASTENING ANALYSIS of your product. Meantime, write for your copy of SPEED NUT "Savings Stories": TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners, Ltd., Hamilton. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S. A.—7 rue Henri Barbusse. Levallois (Seine) France.

Whatever you build—from Aircraft to Clothes Dryers—Think first of Tinnerman for better fastening Engineering!


SPEED NUT WAY: Inset shows how T-shaped tongue locks in place. Can't unlatch unless pressure is applied in diagonal direction and tongue is aligned with slot opening. Can be pre-assembled to wire bundle before fastening to structure. Opens and closes by hand, no tools required.
TINNERMAN
Speed Nut

Men of Industry

PAUL PORTERFIELD
. . . chief engineer, Method X Co.

F. A. KEIHN
. . . a V. P. of Evans Products

HAROLD E. HALLS
. . . sales mgr. for Pollock Co.

Paul Porterfield was appointed chief engineer of **Method X Co.**, an affiliate of Firth Sterling Inc., Pittsburgh.

John W. Pennington, chief engineer of the Piston Ring Department, Koppers Co. Inc., Pittsburgh, was named executive engineer and head of the newly-created Technical Department of **Koppers Metal Products Division.**

Walter L. Wise Jr. was appointed industrial sales manager of **Sperry Products Inc.,** Danbury, Conn. Mr. Wise was formerly sales manager of the Kingston-Conley Division of Hoover Co., manufacturers of electric motors, Plainfield, N. J.

Marvin M. Ramer was promoted to contract manager of the Southwest Division of Chemical Plants Division, **Blaw-Knox Co.,** Pittsburgh. Mr. Ramer's headquarters will be located in Tulsa, Okla., Southwest Division headquarters.

Edison H. Shaw was appointed Cleveland district sales representative for the Plasticizer Division of **Pittsburgh Coke & Chemical Co.** For ten years before joining the company Mr. Shaw was chemical sales representative for Allied Chemical and Dye Corp., New York.

Damascus Tube Co., Greenville, Pa., appointed **Grant H. Mackay Jr.** chief engineer and **R. L. Kelley** as service manager.

F. A. Keihn, manager of the heating and ventilating division, **Evans Products Co.,** Plymouth, Mich., was elected a vice president of the company. He continues to head the bus and truck heater division and will be assigned new corporate activities.

Herbert B. Clark was elected president of Vascoloy-Ramet Corp., subsidiary of **Fansteel Metallurgical Corp.,** North Chicago, Ill., and **Harry W. Highriter** was elected vice president. **Glen Ramsey** was elected vice president of the parent company and **John Meade** was made vice president in charge of industrial relations. **Henry D. Weed** was elected vice president and general manager of Weiger Weed & Co., another Fansteel subsidiary.

James M. Darbaker was appointed director of distribution and availability for **United States Steel Co.,** Pittsburgh. In this position he will be responsible for planning the distribution of products manufactured by U. S. Steel. Formerly he was general manager of sales.

Clark Hutchison was appointed product development and technical engineer, **Ingram-Richardson Inc.,** Frankfort, Ind. Mr. Hutchison has been director of research for Ingram-Richardson and most recently served as ceramic engineer for the Freight Claim Division of the Association of American Railroads.

Harold E. Halls, assistant sales manager since 1945 of **William B. Pollock Co.,** Youngstown, was appointed sales manager and **Emerson W. Morey Jr.** becomes assistant sales manager.

John Tod resigned as a director and member of the executive committee of **Youngstown Sheet & Tube Co.,** Youngstown. To fill the vacancies the company elected **Fred Tod Jr.** as a director and **J. L. Mauthe,** president, to the executive committee. John Tod was vice president of Brier Hill Steel Co. when it was purchased by Youngstown Sheet & Tube in 1932.

W. B. Lawrence, who has been general manager, **Cummins Diesel Sales Corp.,** with headquarters at Columbus, Ind., was elected a vice president. Mr. Lawrence continues to serve as general manager of the eight Cummins dealerships operated by the corporation. He formerly headed the Denver office.

D. J. Owens was appointed sales manager for the **Cleveland Chain & Mfg. Co.** Prior to joining Cleveland Chain, Mr. Owens was with the Automotive Accessories Division of Firestone Tire & Rubber Co.

William C. Scott, vice president of **Outboard, Marine & Manufacturing Co.** in charge of the Evinrude Motors division, was named vice president in charge of merchandising for O, M & M. Mr. Scott will

W. J. RESINER
. . . a tubing sales mgr., Republic

maintain his headquarters in Milwaukee.

W. J. Resiner was appointed manager of stainless steel tubing sales of the Steel and Tubes Division of **Republic Steel Corp.**, Cleveland. Mr. Resiner was formerly sales engineer with Republic, and for the last year and a half has been on leave to work as chief of the tube section of NPA in Washington.

William A. Sipprell Jr. will become president of **Cleveland Welding Co.**, Cleveland, succeeding Harry W. Kranz, who will retire July 1. Mr. Sipprell is also chairman of the board and president of H & B American Machine Co., Pawtucket, R. I.

TOM L. PARKER
. . . Columbia Steel & Shafting V. P.

Columbia Steel & Shafting Co., Carnegie, Pa., appointed **Tom L. Parker** vice president in charge of sales. Previously Mr. Parker had been general manager of sales both for Columbia and for Summerill Tubing Co., with headquarters in Pittsburgh.

M. F. Ohman was appointed to the new post of assistant general manager of the Western Division of **Dow Chemical Co.** Mr. Ohman has been the division's production manager for the last nine years.

George Fouch was appointed manager of subcontracting for the aircraft gas turbine division of **General Electric Co.**, Lockland, O.

Karl R. Van Tassel was appointed general manager of the operating department of the **Knolls Atomic Power Laboratory** of General Electric Co., Schenectady, N. Y. Mr. Van Tassel previously had been general manager of the control department of the same company.

F. D. Weatherholt was appointed sales manager, industrial products, **Westinghouse Electric Corp.**, Pittsburgh, and **J. C. Fink** as engineering manager. **Myron Ceresa** was appointed manager, electroplating projects, special products development division.

Edward J. Morrissey, secretary and sales manager, **Chicago Rivet & Machine Co.**, Chicago, was elected president and general manager to succeed his late brother, **John A. Morrissey. E. P. O'Malley**, treasurer, was elected vice president-production and secretary. **A. J. Dunsmore** is vice president-sales and **John A. Kelly** is treasurer.

General sales manager of **Alloy Precision Castings Co.**, Cleveland, is **S. E. Flenner Jr.**

James O. Wright was elected president of the **Badger Meter Mfg. Co.**, Milwaukee, succeeding his father, the late Charles W. Wright. **William C. Wright** is the new vice president. **P. J. Berner** was appointed secretary-treasurer and controller in addition to being named a director of the firm and a member of the executive committee. **Joseph E. Johnston**, vice president in charge of sales, also was elected a director.

Joseph S. Parry Jr. was appointed assistant manager of the Apparatus Division of **Westinghouse Electric Corp.**, Pittsburgh. Mr. Parry previously was industrial manager of the New York office.

HORTON J. SCHULTZ
. . . joins Ferdinand G. Schultz Co.

Horton J. Schultz joined **Ferdinand G. Schultz Co.**, Pittsburgh, handling dust control, foundry and other industrial equipment and materials. He leaves American Steel Band Co. where he was assistant sales manager.

J. Basil Ward was elected president of **Addressograph-Multigraph Corp.**, Cleveland, succeeding **George C. Brainard** who is now chairman of the executive committee. **Thomas C. Woods Sr.** was elected chairman of the board to succeed his late father, Frank H. Woods Sr.

John D. Judge was appointed president of **Tube Reducing Corp.**, Wallington, N. J., to succeed the late J. J. White. Mr. Judge joined the

JOHN D. JUDGE
. . . president, Tube Reducing Corp.

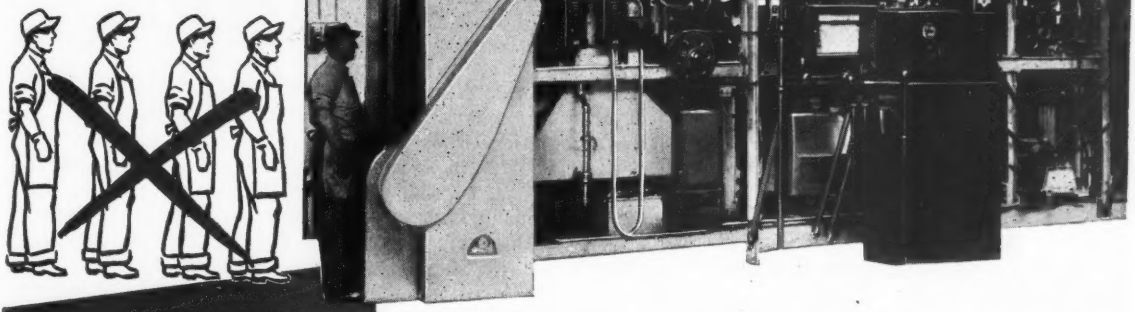
firm in 1948 as executive vice president.

Avery C. Adams, president of Pittsburgh Steel Co., Pittsburgh, was elected president of **Johnson Steel & Wire Co. Inc.**, Worcester,

CUT COSTS WITH THE

Fastest Carburizing

(and case hardening)



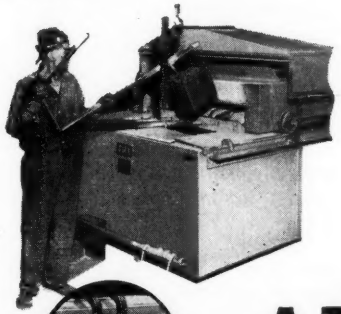
Labor Cost Reduced 80%

. . . by these two mechanized lines using Ajax Salt Baths for carburizing compressor parts in plant of prominent manufacturer of electric refrigerators.

390 Lbs. of Work an Hour

. . . from an Ajax furnace no larger than your desk!

180 lbs. of metal body screws per charge are case hardened (0.004" to 0.010") as required.



More economical . . . is the fastest method of producing a specified case depth—for example, a case of 0.040 in. can readily be produced in 2 hours . . . No boxes or retorts to pack and unpack or to heat as dead loads.

Less distortion . . . temperature uniformity throughout bath guaranteed within 5°F. . . . less subsequent grinding . . . permits more shallow case depths.

Closer control of depth and other properties of the case.

Selective carburizing simplified by immersing only portions of work to be treated.

Eliminates usual reheating operation . . . work quenched directly from carburizing bath.

Extreme flexibility . . . several batches may be case hardened simultaneously—each to a different case depth.

No "oxygenation" of the case, with attendant pitting and spalling, as frequently occurs in gas or pack carburizing.

Readily adaptable to mechanization for efficient, low-cost mass production.

Combines with martempering . . . for best control of distortion . . . by an isothermal salt bath quench directly after carburizing.

Brazing can be performed simultaneously . . . both carburizing and brazing done with one heating of the work. Brazing cost—nothing.

Low maintenance costs . . . plain steel pots have a life of 1 to 3 years.

AJAX ELECTRIC COMPANY, INC.

952 FRANKFORD AVENUE PHILADELPHIA 23, PA.

World's largest manufacturer of electric heat treating furnaces exclusively

In Canada: Canadian General Electric Co., Ltd., Toronto, Ont.

AJAX ELECTRIC SALT BATH FURNACES

JOHN M. APPEL
. . . gen. mgr., Farmers Engineering

E. M. KLINE
. . . gen. mgr., nickel works

CHARLES C. REIFF
. . . chief engineer, Rockwell div.

Mass., a subsidiary of Pittsburgh Steel, succeeding George E. Peace who has retired. **E. Milton Barber** was elected executive vice president of the subsidiary company.

Farmers Engineering and Manufacturing Co., Pittsburgh, appointed **John M. Appel** general manager. Mr. Appel was with Pittsburgh Plate Glass Co. for the last 17 years as glass manager of the Pittsburgh branch.

Edmund T. Flanagan was elected vice president in charge of sales for **Fairbanks Co.**, New York. Mr. Flanagan was previously New York and regional sales manager for the company.

Horace T. Potts II was appointed general manager of the **Horace T. Potts Co.**, Philadelphia, succeeding Claude Mengel, deceased.

A. J. Rosebraugh was appointed sales manager of refrigeration, **Philco Corp.**, Philadelphia.

E. M. Kline is being made general manager of the Huntington, W. Va., Works of **International Nickel Co. Inc.**, effective July 1. Mr. Kline succeeds Herman M. Brown who is retiring as general manager, but who will still serve the company on a consulting basis.

George C. Ford was made vice president in charge of manufacturing for **Norris-Thermador Corp.** Los Angeles. Before coming to this company Mr. Ford was vice president in charge of manufacturing for Joyce Inc., Pasadena, Calif.

J. C. Morrison was appointed manager of the Carboloy Department plant in Edmore, Mich., **General Electric Co. N. J. Corwin** was appointed manager of GE's tube works, Scranton, Pa.

Truman B. Brown was appointed assistant to the vice president of sales, **Allegheny Ludlum Steel Corp.**, Pittsburgh. He has been Detroit district sales manager.

Rockwell Mfg. Co., Pittsburgh, appointed **Charles C. Reiff** chief engineer in charge of its Barberton, O., division and **Bernard Last** as project engineer, lubrication department, at Pittsburgh to succeed Mr. Reiff. In his new position Mr. Reiff is responsible for engineering and manufacture of Nordstrom valves.

Illinois Tool Works, Chicago, elected **Robert F. Dick** vice president and assistant to the president, **Austin E. Cole** as vice president and treasurer, and **J. B. O'Connor** as vice president and manager, new tool development.

Ted C. Gorman was named purchasing agent, **Heli-Coil Corp.**, Danbury, Conn., to succeed **Eugene Hack**, resigned. Mr. Gorman formerly was purchasing agent for Speed Products Co.

Hydropress Inc., New York, appointed **Jacques W. Lourie** director of foreign sales.

OBITUARIES...

William H. Hoover, 63, president, **Anaconda Copper Mining Co.**, New York, died June 6 at Butte, Mont., after a long illness.

Lawrence A. Cousins, 58, vice president and treasurer, **J. D. Cousins & Sons Boiler Works**, Buffalo, died June 1.

Walter Evans, 53, vice president, **Westinghouse Electric Corp.**, Pittsburgh, and president of Westinghouse Radio Stations, died May 28.

Charles E. S. Dickerson, 48, formerly a vice president of **Columbia Steel & Shafting Co.**, Pittsburgh, died June 6 in Chicago where he recently became sales manager for the **Korhumel Steel & Aluminum Co.**

John A. Ladwig, sales representative of **Bliss & Laughlin Inc.**, Harvey, Ill., died June 6 at his home in Chicago. Mr. Ladwig had been with the company 25 years.

Duncan C. Macdonald, at retirement in 1945 eastern district purchasing agent, **American Steel & Wire Division**, U. S. Steel Co., died June 4 at his home, Worcester, Mass.

Capt. Guy A. Richards, representative for the **Worden-Allen Co.** in northern Wisconsin, Michigan and Minnesota, died June 5, at 67.

Alfred F. Kessler, 53, comptroller of **Chain Belt Co.**, Milwaukee, died June 6 at his home.

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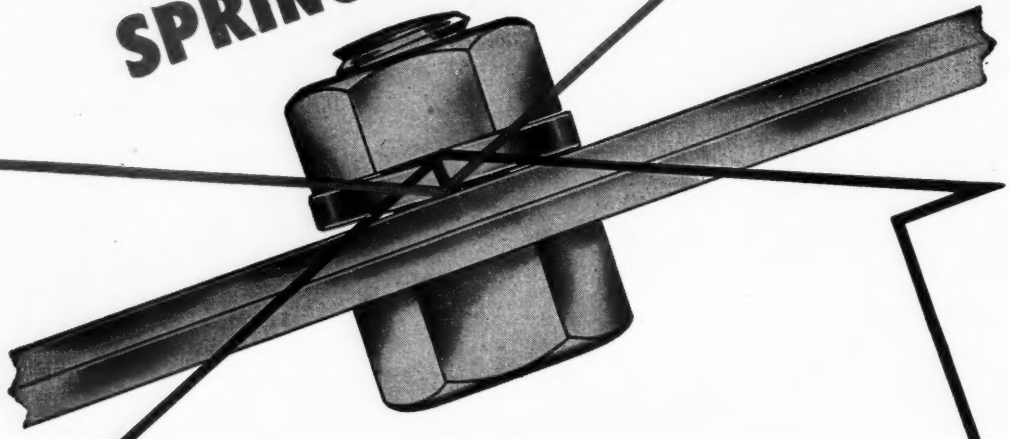

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Production AND Engineering
NEWS AT A GLANCE

HAND SOLDERING OUT—New technique involving printed unit assemblies for television receiver production saves critical materials and reduces labor, two Sylvania engineers, W. H. Hannahs, and Norman Stein, told radio engineers meeting in New York. The method divides a television set into about 20 subassemblies, each containing an electron tube and associated components. Each unit is made by printing the associated components on two small "cards", one of a ceramic material and the other of plastic. Multiple electrical points between the "cards" are made simply by dipping them in molten solder, eliminating need of interconnecting wires.

RUBBER'S STRETCH DOES IT—Engineers can build better aircraft structures by applying loads to rubber models of the metal skins of aircraft, then measuring the resulting stretch of the rubber. A British research report details the technique and indicates that, by using it, stresses can be conveniently determined—with sufficient accuracy for engineering purposes—in those structural components which are too complex for stress analysis by current analytical methods.

FINE FINISHES FASTER—Improving the finish of a product often adds considerably to the manufacturing cost by requiring new operations, methods and equipment. But it is sometimes possible to produce a better finish with your present equipment and standard tools if the proper techniques and tools are employed. Reaming is one operation capable of producing finer finishes. It can provide them faster too if such variables as feed and speed, stock removal, coolant, tool design and tool sharpening are "harnessed" properly. —p. 96

OVERHAULS DROP—Combining additives never before attained on a commercial basis, a new fortified lube oil, developed by Shell Oil, is subsantially extending the serviceable life of industrial and materials handling trucks, gasoline engines operating in door-to-door, intermittent service. Tests show the oil cuts down engine wear to such an extent that both oil consumption and overhauls are reduced. One concern using the oil to eliminate objectionable exhaust smoking also found it reduced overhaul and replacement costs by $4000 per year.

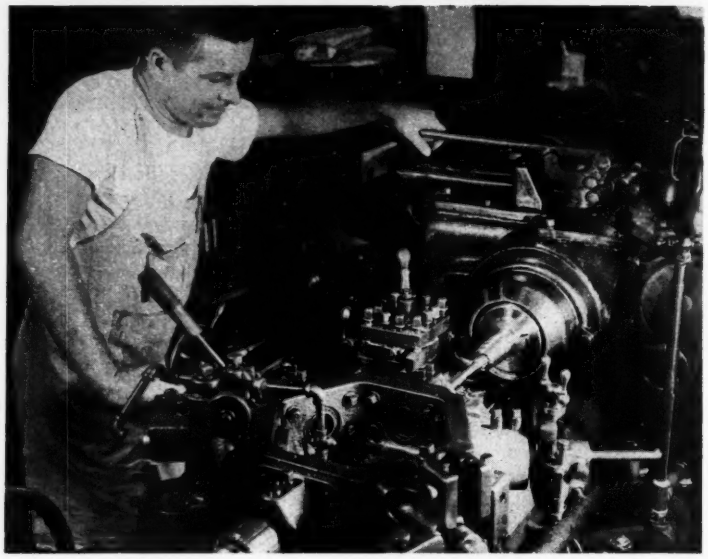
NO TEETH BUT BITE THERE—Take care of that box strapping material, it may be more valuable than you think. In an attempt to cut monthly expenditure for bandsaw blades, which came to $2500, Solar Aircraft Co., San Diego, found that ordinary box strapping material without teeth cuts stainless steel just as well as conventional blades. The strapping not only cuts as well but lasts longer and costs less. The process, evolved by Jack Prince, Solar's methods analyst, is being released to industry as an aid to the defense effort, the company says.

TESTING BY SOUND—Application of ultrasonics to inspection and measuring problems is growing as understanding of sound behavior in materials improves. Trend now is toward automatic handling equipment for repetitive testing. In one setup, pipe couplings for the oil field are tested for cracks, laminations and voids at reasonable production speeds. The operator is able to inspect the couplings with only brief instructions. —p. 99

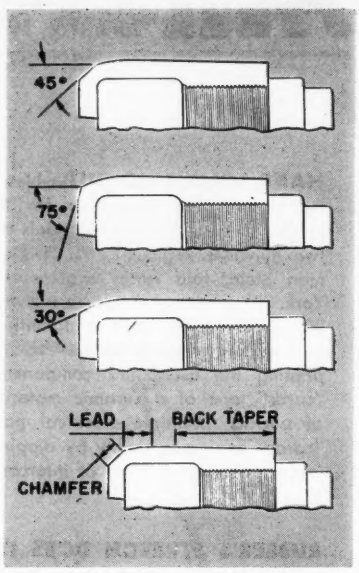
BRAZES HARD-TO-WET CARBIDES—Latest metal joining composition developed by Handy & Harman, New York, brazes chromium carbide, cast carbides and other hard-to-wet carbides. The company says it also is effective on high tungsten-copper alloys, cermets and other refractory alloys difficult to braze. Composition of the new alloy is 57 per cent silver, the balance copper, manganese and tin. It has a melting point of 1120° F, and a flow point of 1345° F. No volatile elements are included in the alloy, and it is nonsusceptible to dezincification type of corrosion.

MORE OUTPUT, LESS FLOOR AREA— If your floor space is disappearing under a maze of new machines and assembly lines, perhaps what Ryan Aeronautical did might help you. Ryan's supervisors were forced to dig for ideas, but the solution came. It is a fabrication setup built around a continuous belt conveying system. It did two things—stepped up output, in this case manifolds for Army tank engines, and cut factory space requirements in half. The production "pipeline" stretches about 140 feet through the heart of the plant. —p. 149

BEADS TO BEARINGS—Army Ordnance Corps plans to reactivate three remaining production lines at the Indiana Ordnance Works, with initial production starting in May, next year. First three lines currently being reactivated will start producing this month. Total output will consist of smokeless powder . . . A bearings plant at Rolla, N. Dak., also will be reactivated by Ordnance, using buildings and World War II surplus machinery for making jewel bearings. American Indians, adept at making small beads, will be taught the special skill needed for turning out these minute bearings.



Oil-feed reamer used on a screw machine. On AISI 1137 steel between 800 and 1000 pieces per sharpening are obtained in production using this reamer



Some examples of how chamfer can be varied for different types of cut. From top to bottom—Normal cuts, heavy cuts, light cuts, smoother finish

PRODUCTION REAMING: Fine Finishes Faster

Finishes of 30 microinches are possible on many types of production reaming jobs. Primary requisites are adequate machines, tooling and tools, plus proper reamer sharpening

TREND toward increased machining accuracy places added emphasis on finer finishes for the machined surface. Improving the finish of a product often adds considerably to the manufacturing cost by requiring new operations, methods and equipment. But it is sometimes possible to produce a better finish with your present equipment and standard tools if the proper techniques, tools and tooling are employed.

Reaming is one operation capable of producing finer finishes than those normally obtained. Quality of a reamed finish is the product of many variables such as condition of the machine and tooling, feed and speed, stock removal, coolant, tool design and tool sharpening. Although all these variables must be considered for any machining operation, some of them deserve special consideration when applied to reaming.

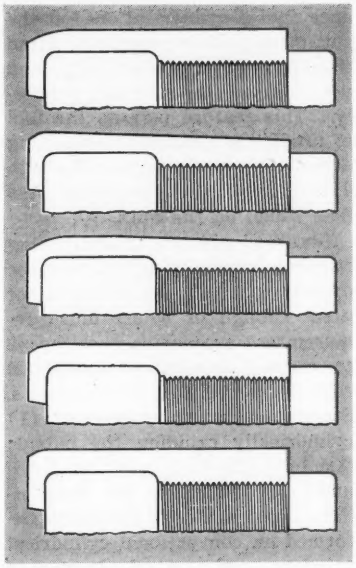
Reamer Design — An important feature of reamer design is the spacing of flutes or blades. To obtain the best possible finish, the blades should be unevenly spaced around the periphery. This type of blade spacing provides a smooth cutting action and fine finish, and prevents the reamer from forming welts. To aid in inspection, the blades should be located diametrically opposite each other so the reamer diameter can be checked with a micrometer across any two blades.

Blades in inserted-blade type reamers must be mounted rigidly in the body. Means of holding the blade in the slot must also be rigid to prevent the blade from moving in any direction even under long and severe service. Maximum stability prevents out-of-roundness and rough finish.

Finish of the hole is dependent upon the number of blades in the reamer. The more blades, the finer the finish will be. Therefore, the blade-holding mechanism should occupy as small a space as possible.

Stops Chatter — A small left-hand helix angle on the blades will usually help to stabilize the reamer in the cut and prevent chatter. Although helical flutes can improve the action of a reamer, they are usually confined to small angles of approximately 3 degrees to 10 degrees because larger angles tend to build up end pressure. To improve cutting action, blades are often provided with a 3-degree or 4-degree positive rake angle. However, special blade offsets can be used to solve particular cutting problems in certain metals.

Solid-fluted reamers are also ca-



Five basic starting point profiles. Top to bottom: Steel reaming, screw machine reaming, cylinder reaming, through-hole reaming, hand reaming

By F. R. SUND
Reamer Engineer
Small Tool Division
Barber-Colman Co.
Rockford, Ill.

pable of producing fine finishes. These reamers are usually used for small holes or for the ultimate in precision, such as jig boring reamers. The number of flutes also helps to control the finish. All except the very small sizes can be obtained with unequal spacing of the flutes. A small left-hand helix can help improve the finish.

One type of reamer designed for screw machine and turret lathe work is the oil-feed reamer. It has a hole through the shank and body to supply cutting oil to the nose of the reamer. The oil-feed reamer flushes the chips away. Oil reaches the cutting area which is not accessible except through the reamer.

Which Profile? — Profile of the blade or flute comprises several elements. These elements can be varied to improve finish of the reamed surface. Many reaming jobs have been vastly improved with a special profile established by the cut and try method. There seems to be no particular profile, however, which will always work best under any given set of conditions.

Amount of chamfer, or point, is determined by the amount of stock to be removed, specification of the material being reamed and type of chip desired. Normally, a 45-degree chamfer is used for general-purpose reaming. For light cuts, a chamfer of 15 to 30 degrees may be used. For heavy cuts which require end cutting, the chamfer may be increased to 75 degrees.

Chip Size Controlled—A slight secondary angle, or lead, behind the chamfer often produces a smother finish and permits heavier feeds. Lead controls the size and form of the chip. It may be varied as to angle and length, depending upon the material being cut.

For fine finishes, a straight portion is usually designed between the lead and the back taper. This portion is parallel to the axis of the reamer. Ordinarily, feed marks would be produced on the surface. However, the straight portion "irons out" the feed marks to produce a better finish. It is usually made about ⅛-inch longer than the amount of feed per revolution but can be varied to suit a specific application.

Speed Depends on Material — Speed for reaming is closely tied in with, and dependent upon the type and hardness of the material being reamed, rigidity of the machine and tooling, and the tolerances or quality of finish desired. When high production is the priary factor, use a slow speed with an increased feed. This combination will permit a freer cutting action and produce more holes per sharpening.

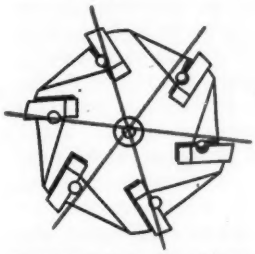
In general, the speed should be 65 to 75 per cent of that used for drills. This should be varied according to the amount of stock to be removed and the quality of finish desired. A slow speed is usually recommended for a fine finish. In starting a new reaming job it is well to begin with a very low spindle speed, increasing it gradually as the best cutting clearance and blade profile are developed in sharpening.

In reaming extremely hard steels, such as nickel alloys, the speed may range as low as 20 to 30 sfm. On the other hand, soft metals, such as magnesium and its alloys, may be successfully reamed with speeds as high as 270 sfm.

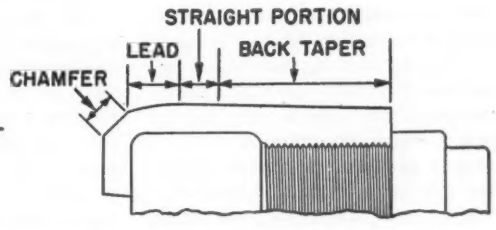
Higher Feeds — Unlike speeds, feeds used for reaming are much higher than those recommended for drilling. A suggested rate of feed is approximately three times that used for a corresponding drilling operation. A good starting point is between 0.0015 and 0.004-inch per revolution, depending upon the material.

From the starting feed, work up as high as possible, maintaining the required accuracy and finish. Too fine a feed causes friction and generates heat in the cut, resulting in a poor finish. Also, a heavy stock removal with a high feed tends to make the reamer cut oversize and is detrimental to the finish.

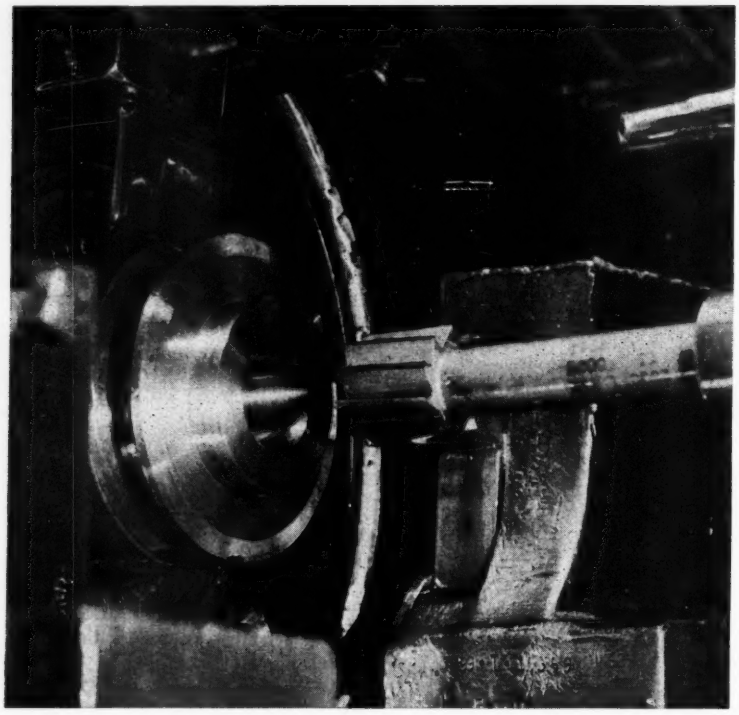
Of utmost importance in obtaining a quality finish in conjunction with satisfactory production and tool life is the profile of the reamer blade and the cutting clearance. Starting with a standard profile for the type of cut and material being reamed, the various elements of the blade profile should be varied to produce the desired finish



Standard irregular blade spacing is arranged so pairs of blades are diametrically opposite each other. This spacing gives smooth cutting action



Profile of blade or flute comprises several elements. These can be varied to improve finish of reamed surface. Double angle increases stability



Fine finish produced by a solid-fluted reamer. Reamer has a special cam grind and flutes have a slight right-hand spiral to impart desired finish

and accuracy. At the same time, feed and speed should be changed to give the required production and tool life.

Stock Removal Varies — Sufficient stock must be removed to avoid scraping or glazing, conditions which may cause undersize holes and poor finish. The amount of stock to be removed will vary with the type and hardness of the material, feed, speed, finish and accuracy required, diameter of hole, chip clearance and blade profile. Ample stock must be left to allow the reamer to take a definite cut. The amount of stock left for finish reaming should seldom exceed 0.012-inch on the diameter. When coarse feeds are used, a 0.003 to 0.004-inch stock on the diameter is often recommended.

Since reaming is primarily a sizing and finishing operation, preparation of the hole is very important. Poor finish and accuracy are often a product of careless roughing and semi-finishing operations.

Sharpening Controlled — After complete experimentation to determine the blade profile that will produce the best finish, it is desirable to have some means of duplicating that profile accurately when the reamer is resharpened. This is particularly true with inserted-blade reamers which can be adjusted for diameter size.

The cylindrical grind and back-off method of reamer sharpening is satisfactory for many types of chucking reamer and screw machine jobs. However, much closer control of certain sharpening elements is often desirable or necessary. Toward this objective, Barber-Colman has developed a sharpening system, or method, that makes it possible to control accurately and mechanically diameter size, cutting clearances, peripheral profile and lead of helix on a production sharpening basis.

All operations in this method are easily performed on the Barber-Colman automatic reamer sharpener, or the combination hob, cutter and reamer sharpener. Diameter cutting clearance, back taper, nose form and chamfer are all ground in the same operation, using a cup wheel, and these elements are accurately controlled in the machine by a form cam.

Gives Positive Clearance — This method provides a positive clearance (not a cylindrical one) at the cutting edge. It is possible to grind to a theoretically sharp edge and yet hold the diameter size precisely. This feature permits the tool to produce a cleaner, freer cutting action than would be possible with a cylindrical land, resulting in a finer finish on the hole.

Standard practice in sharpening reamers is usually satisfactory for operations where production is not great enough or where finish requirements are not so exacting as to warrant investment in special reamer sharpening machines. Standard practice consists of (1) cylindrically grinding the outside diameter, (2) backing-off the flutes and (3) grinding the chamfer. These operations are generally performed on conventional cylindrical grinders and cutter sharpening machines. On production jobs where it may be possible to replace the present finishing operation with reaming, use of the form cam method of sharpening may reduce the overall cost of the part.

30-Second Cycle—The term "fine finish" is a relative quantity. The only way to define it so that it has definite meaning for a particular job is in terms of a microinch finish. On some operations, a fine finish may mean no better than 100 microinches or more, while on others a finish of 5 microinches may be required.

In one application of an oil-feed reamer used on a screw machine, a 20-30 microinch finish is obtained on the hole with a feed of 1.75-inch per minute and a speed of 280 rpm. The hold diameter is 1.003-inch; length of cut is ⅞-inch. Cycle time for the reaming operation is approximately 30 seconds. Material is AISI 1137 steel. Between 800 and 1000 pieces per sharpening are obtained from this reamer while maintaining this fine finish.

Fine finishes are also available from inserted-blade reamers. On one application, a finish of approximately 30 microinches is obtained at the rate of 500 pieces per sharpening. Size is maintained on this many pieces within 0.001-inch. The steel in this application has frequent hard spots which are more injurious to the cutting edges than many types of material.

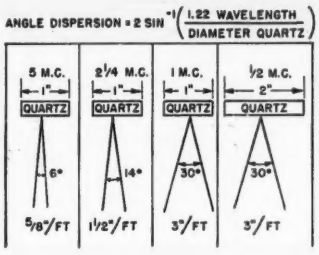


Fig. 1—Beam divergence of sound waves in steel varies with frequency

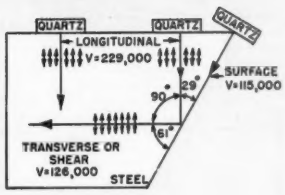


Fig. 2 — Diagram shows longitudinal sound striking a surface at an angle

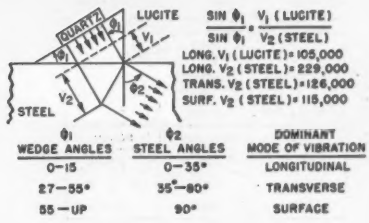

QUARTZ
LUCITE
STEEL
SIN φ1 / SIN φ1 = V1 (LUCITE) / V2 (STEEL)
LONG. V1 (LUCITE) = 105,000
LONG. V2 (STEEL) = 229,000
TRANS. V2 (STEEL) = 126,000
SURF. V2 (STEEL) = 115,000
φ1 WEDGE ANGLES
φ2 STEEL ANGLES
DOMINANT MODE OF VIBRATION
0–15 | 0–35° | LONGITUDINAL
27–55° | 35°–80° | TRANSVERSE
55 — UP | 90° | SURFACE

Fig. 3—Sketch showing why refraction must occur when velocities change

ULTRASONICS . . . *Inspection Applications Grow*

Trend toward automatic handling equipment for repetitive testing is growing. Value of tests depends upon the instrument operator and upon interpretation of data

APPLICATION of ultrasonics to inspection and measuring problems is growing as understanding of sound behavior in materials improves. Sound is now widely used to investigate internal flaws in castings or forgings and to determine thickness of metals with corroded inside surfaces or baked by liquids.

Heart of an ultrasonic system is the method of transforming electrical pulses into mechanical vibrations, and transforming the mechanical vibrations back into electrical pulses. This phenonema is called piezoelectric; most common substance used for this purpose is quartz.

If an electrical field is applied across a piece of quartz its thickness will vary as the frequency of the applied field. Conversely, if pressure is exerted on the face of the quartz, it will generate a small voltage of the same frequency as the applied vibration. The assembly holding the quartz is called a "transducer", and commonly refered to as a "searching-unit."

Acceleration Without Motion — Actual movement of quartz-vibration is infinitesimal; it is often described as acceleration without motion. To transmit such a small amount of energy into a material, it is necessary to use an uncompressible couplant between the quartz face and the material surface. Oil is most commonly used for this purpose.

Fig. 1 depicts and illustrates the beam divergence of the sound waves traveling through steel, and how this beam divergence varies with frequency and quartz diameter. The higher frequencies are more directive, and a 1 inch diameter crystal at any frequency is more directive than a ½-inch diameter crystal. In ultrasonic testing, beam divergence is usually expressed in inches per foot, rather than angular degrees.

Velocity — Frequency — Wavelength — Sound beam transmitted into the steel by the quartz is a compressional type wave, with the particle vibration in the direction of propagation. This mode of sound vibration is called "longitudinal," but common usage of the word "sound" has come to imply "longitudinal sound".

In practical testing, frequency selection depends upon sensitivity desired and sound penetration required.

In addition to sensitivity and penetration, wave-length also determines the pulse length. Assume that a 5-cycle train of waves is generated by the quartz. Length of the wave train would then have to be five times the wavelength, and the space occupied by the wave-train would be directly proportional to the length of each wave. Low frequencies therefore have longer pulse-length, while high frequencies have shorter pulse-length.

Factor which determines sound reflection at a boundary is the product of density and velocity, and is called the acoustic impedance. If sound traveling in steel encounters an abrupt change in medium, the per cent energy reflection is determined by the acoustic impedance of the steel as compared to the acoustic impedance of the other medium. The relation is the difference of impedances, divided by the sum of impedances, quantity squared.

Mode of Vibration—One other phenomena can occur when sound

By RALPH H. FRANK
Sperry Products Inc.
Danbury, Conn.

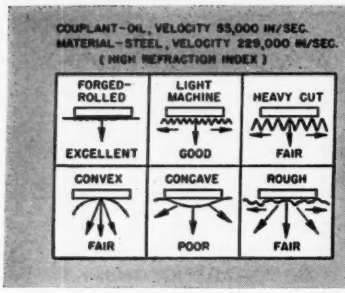


Fig. 4—Six typical surfaces encountered in ultrasonic testing processes

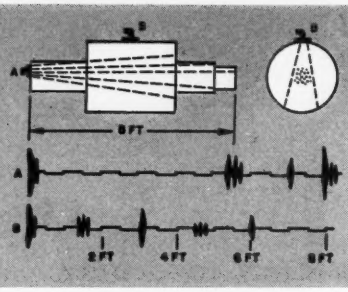


Fig. 5—Sound patterns with the searching unit placed in positions A and B

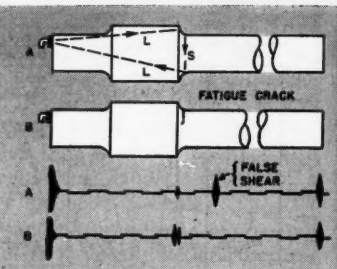


Fig. 6—In this crane shaft, direct sound path is to the opposite end

waves travel through material. Mode of vibration may be transformed and a different velocity assumed. Fig. 2 shows what happens when longitudinal sound strikes a surface at an angle. Depending upon the angle, some or all of the incident wave is converted into shear-waves, whose particle movement is transverse to the direction of wave travel. This transformation into shear waves slows the velocity to approximately half the speed of the longitudinal wave. The particular angle of 29 degrees shown in the sketch is significant for two reasons:

1) When a longitudinal wave strikes a surface at 29 degrees in steel, the resultant shear wave travels at 90 degrees to the incident wave.
2) When a longitudinal wave strikes a surface at 29 degrees in steel, 98 per cent of the incident energy is converted into shear.

At an angle of 61 degrees, 50 per cent of the energy is converted into shear, and 50 per cent of the energy remains longitudinal. At angles greater than 61 degrees, the percentage energy conversion into shear drops off sharply. At angles less than 61 degrees, the percentage energy conversion into shear increases sharply.

Surface Wave Generated—If the quartz is placed on the sharp edge of the steel as in Fig. 2, a third mode of vibration, known as a surface wave, can be generated. Such a wave travels along the surface of the steel at a velocity approximately half the speed of the longitudinal wave.

From data presented by the author at the Iron & Steel Conference of the Instrument Society of America, April 3 and 4, Pittsburgh.

Sketch in Fig. 3 illustrates and explains why refraction must occur when velocities change. Speed of sound in Lucite is approximately half the speed of longitudinal sound in steel. When the leading edge of the sound wave traveling through the Lucite reaches the steel interface, it doubles in speed as it enters the steel, and therefore travels twice as far in a given time as it would in the Lucite.

Surface Effects—Since ultrasonic test methods depend upon intimate contact and coupling of a quartz searching unit to the material under test, surface conditions are of prime importance. Fig. 4 shows six typical surfaces encountered, and rates them as excellent, good, fair and poor. Such rating is based on the amount of sound energy transmitted normal to the searching unit, which is the only energy that is likely to reflect back to the searching unit.

On a forged, rolled or ground surface, intimate contact between searching unit and material is obtained, and all the sound energy is transmitted normal to the work surface. Such a surface is excellent for ultrasonic inspection.

Sound Scatters—On a light machined surface, good contact is obtained, but there is scattering of the sound from the normal, due to refraction at the tool marks. In some cases, refraction may cause a surface wave to be generated, which might lead to a false interpretation of the sound pattern.

On a heavy machined surface, a more pronounced scattering of the sound-beam occurs, but there is sufficient energy transmitted normal to the work face to make a reliable and sensitive test.

A convex surface is satisfactory for testing. At the line of contact, the sound is introduced normal to the surface, but on either side of this line of contact, the sound is refracted slightly by the oil couplant. This gives a wide angle sound cone, which is generally advantageous in testing rounds and other convex surfaces.

11% Transmission—A concave surface is poor for testing, although not entirely impossible. Using a heavy oil or grease to fill up the concavity, about 11 per cent of the sound energy can be transmitted into the steel. Of this amount, however, only a fraction would enter the steel normal to the searching unit, and the balance would be refracted by the oil at diverging angles.

A rough surface, such as a casting, is generally a fair test surface provided it is not covered with sand. The uneven and nonuniformity of such a surface makes it impossible to predict the amount of energy transmitted normal to the searching unit; only gross defects could be detected reliably.

Sensitivity of the amplifier in the Reflectoscope makes it possible to test with only a fraction of a per cent of the total energy being reflected back to the researching unit. On many surfaces, however, we are limited in the amount of amplification we can use, due to pulse flare, and surface noise.

Test References Set Up — For practical use and acceptance of any nondestructive testing method, standards must be established. Most plants using ultrasonic testing have developed internal plant standards for their own use and reference, and recently through a

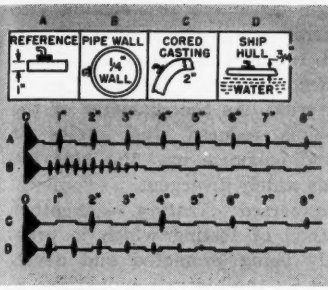


Fig. 7—Reflection technique for measuring the thickness of a part

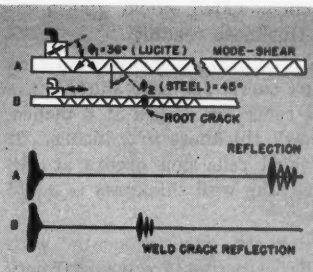


Fig. 8—Testing method and sound patterns for testing plate and weldments

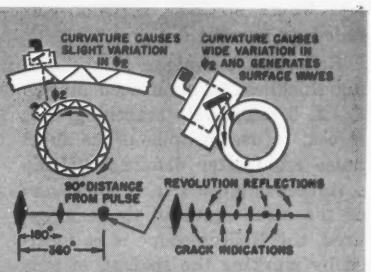

CURVATURE CAUSES SLIGHT VARIATION IN
CURVATURE CAUSES WIDE VARIATION IN AND GENERATES SURFACE WAVES
90° DISTANCE FROM PULSE
REVOLUTION REFLECTIONS
CRACK INDICATIONS

Fig. 9—Sound paths and sound patterns in angle testing, pipe testing

committe of ASTM, work has been started on developing industry standards. Reference blocks with various diameter flat-bottom holes from 1/64-inch to ¼-inch diameter are being considered.

In using such reference blocks, two methods of interpretation can be made. Most common method is to tune the Reflectoscope so the indication from the test hole gives a specified height. In testing, indications are evaluated as less than or greater than the reference indication height.

The other method of interpreting is to compare the height of the indication to the height of the back-reflection, and express this as a percentage of the back-reflection. This method has the distinct advantage that size, shape and surface conditions do not vary the relationship.

In the standardization program, test frequencies are also being suggested and adopted. For example, in the tool-steel, aircraft and forging industries, a test frequency of 2¼ magacycles is the accepted and used frequency. In the foundry industry, frequencies of 1 and ½ megacycles are considered standard.

Forged Rotor Tested—In testing a large forging or casting such as in Fig. 5, when the searching unit is placed in position "A", the sound pattern shown below would result. The sound travels through the piece, and reflects off the shoulders as well as the end. With each marker set for 6 inches, distances to all shoulders and the end can be measured, confirming that the sound has penetrated the roll to the end without any abnormal indications. In such an "end-test" the operator is generally looking for transverse cracks.

Testing along the outside diameter surface as in position "B", the center area would be examined for longitudinal cracks, voids, pipe etc. If the forging contained center porosity, our sound pattern would show the extent and area of such porosity as in B.

Maintenance Testing—A typical maintenance application is to test installed shafting, press columns, crankshafts, and other highly stressed parts subject to fatigue action. Such applications require both experience and judgment, or enough similar pieces that comparison tests can be made.

In testing a crane shaft, as in Fig. 6, the direct sound path is to the opposite end; a back-reflection should be obtained in a good shaft. Some of the sound would reflect back direct from the fillet, and would give a small indication at the correct fillet distance. The sound, however, that struck the fillet at 29 degrees would be converted into shear, cross the shaft at 90 degrees and be converted back into longitudinal sound and then be returned to the searching unit.

This sound path is shown in "A", and it's affect on the sound pattern shown below. A false indication would appear at a distance the diameter of the shaft in back of the fillet.

In testing of any pieces with fillets or tapers, the possibility of a false shear reflection must always be investigated before condemning the piece. A quick method of confirming or disproving such an indication is to test from the opposite end. Distance measurements will always confirm an actual crack at a specific location, but distance measurements from both ends will never jibe with false shear indications.

If a fatigue crack occurs in the fillet as in "B", it can readily be identified and its depth plotted on the end of the shaft.

End Reflections—Another interesting phenomema occurs in the end tests of pieces of long length compared to thickness. Instead of a single back-reflection, two or more equally spaced reflections are likely to appear. The sound paths causing these extra reflections are shown, and since the sound crosses the thickness at a constant angle and a constant velocity, the spacing of these end reflections is a measure of the thickness of the piece.

In steel, the thickness of the piece is equal to the spacing between any two reflections divided by a constant of 0.76. In aluminum the constant is 0.90.

In all cases the stray sound paths, wave conversions etc., must occur after the direct reflection, since such paths are longer, and in the case of wave transformations, velocities are much slower. It is a good general rule to consider only the distance to the first end-reflection in interpretation and ignore in most cases the miscellaneous reflections that may follow.

Thickness Measurements — Two methods of measuring thickness with ultrasonics are commercially available. Each has certain advantages and limitations. The method based on resonance is particularly applicable in thickness ranges of 0.025 to 0.300-inch,

and where surfaces are not corroded or immersed.

Reflection technique in measuring thickness is illustrated in Fig. 7. A 5 megacycle searching unit is best to use, because of its short pulse and better definition. Using a reference piece 1 inch thick, and of the same material to be measured, the Reflectoscope is calibrated by marking the spacing of successive reflections on the oscilloscope tube, or by accurately setting the markers for ½-inch increments. Appearance of the scope would be as shown in "A" of Fig. 7.

Suppose the thickness of the reference piece were reduced by 1/32-inch. The first reflection would shift to the left by 1/32-inch; second reflection by 1/16-inch; the third by 3/32-inch, etc. Each successive reflection would multiply the difference in thickness, and the eighth reflection would occur on scale at 7¾-inches, instead of 8 inches. The slight shift which occurred at the first reflection could not be discerned or measured, but the ¼-inch shift which resulted at the eighth reflection can be easily read and measured. The rule then for taking accurate thickness measurements is to read the length of multiple thicknesses, and divide by the number of multiples.

Count the Multiples—In measuring a ¼-inch pipe wall, it would be difficult to count the number of multiples, since some would be obscured in the pulse. In such a case, count the number of multiples in one inch, which would give a direct thickness reading.

In measuring a casting such as a tank turret for core shift, if the third reflection occurs at 6 inches, the wall thickness is 2 inches. If the third reflection occurs at 6½ inches, the wall thickness is 2 1/6 inches.

Thickness measurements with the Reflectoscope are not extremely accurate, but the advantage of being able to measure metals with corroded inside surfaces, and metals backed by liquids makes this method in many cases the only possible way to obtain thickness measurements.

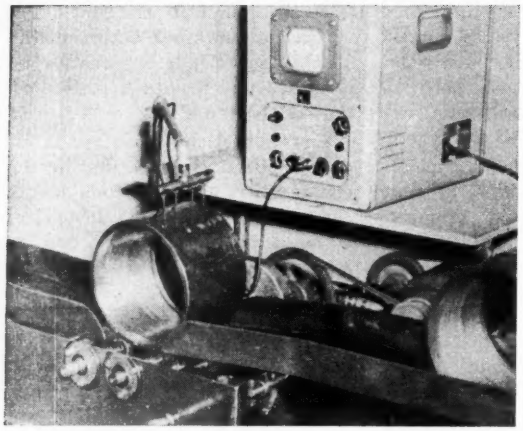


Fig. 10 — Production line setup illustrates trend toward automatic handling equipment for repetitive testing operations

Angle Testing—Another general application and method of ultrasonic testing is the use of shear waves introduced from the surface of the material at an approximate angle of 45 degrees. A quartz crystal mounted on a Lucite wedge of about 36 degrees, is assembled in a suitable holder. Refraction causes the sound to enter the steel at approximately 45 degrees, and at this angle, 90 per cent of the incident energy is converted into shear waves. Due to the slow velocity of shear waves, their wavelength is proportionately shorter.

Testing at 1 megacycle with an angle search-unit, is approximately equivalent in sensitivity to testing with a 2¼ megacycle standard search-unit. Fig. 8 illustrates the testing technique and typical sound patterns in the testing of plate and weldments.

Testing of Pipe & Tubing — Angle testing is also coming into general use in the testing of pipe and tubing. Sketches in Fig. 9 indicate the sound paths and sound patterns. As the diameter of the pipe is reduced, the angles of sound entrance into the pipe become widely divergent.

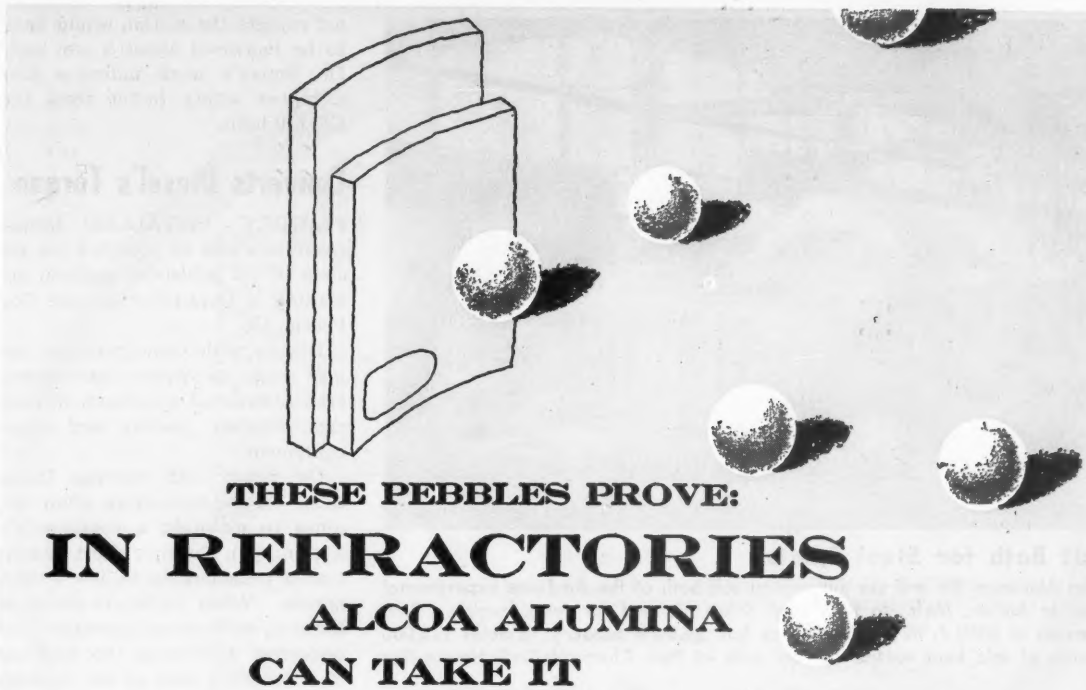
Immersed Testing — Another method of testing which is presently being promoted and developed by the aircraft industries, is to immerse the material in water, and eliminate direct surface contact of the searching unit. Of the 100 per cent energy generated at the quartz, 88 per cent will be reflected back at the water-steel interface. Of the 12 per cent entering the steel, 11 per cent will be reflected from the steel-water interface. Of the 11 per cent reflected in the steel, only 1 per cent will be transmitted to the water and return to the searching unit.

Because only 1 per cent of the transmitted energy passes through the steel and returns to the searching unit, it might be expected that immersed testing would be impractical. In actual practice, however, and because of the available sensitivity in the amplifier of the reflectoscope, the test is practical in spite of the 99 per cent energy losses.

Semiautomatic Testing — In ultrasonic testing, value and usefulness of the test results are entirely dependent upon the instrument operator, and proper supervision. A trend toward automatic handling equipment for repetitive testing is shown in Fig. 10. In this machine, pipe couplings for the oil fields are being inspected for cracks, laminations and voids, at reasonable production speeds. The machine operator, with only brief instructions, is able to inspect the couplings.

Casting Specifications Charted

Standard specifications for more than 70 designated classes of steel castings are incorporated in a summary chart compiled by Steel Founders' Society of America, Cleveland. Chart covers pertinent data on almost all general engineering types of steel castings. It lists recently adopted specifications and some revisions of previous standards.



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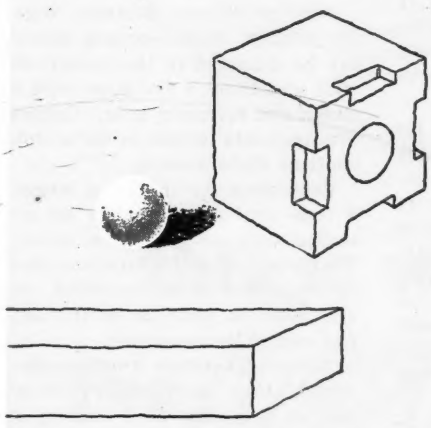

In a recent 7-month test conducted by the Bureau of Mines*, ALCOA Alumina proved it can stand up under grueling treatment. During this period, ALCOA Tabular Alumina pebbles passed through a commercial-size pebble heat exchanger. During each cycle they were alternately heated to above 2000° F. and cooled to 300°-450° F. Yet under these extreme operating conditions, the ALCOA pebbles gave excellent service and considerably out-performed other pebbles tested. They showed unusually low breakage from heat and mechanical shock as well as outstanding resistance to abrasion. These same excellent results are being attained with ALCOA Alumina pebbles in other commercial pebble heat exchangers.

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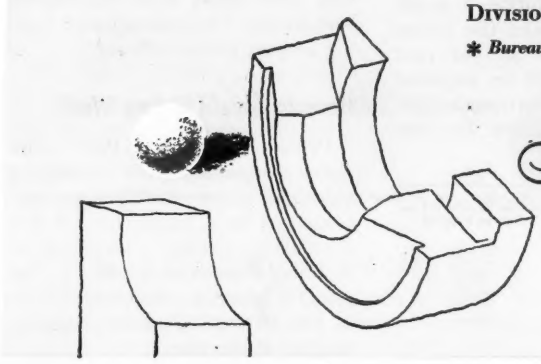
* *Bureau of Mines, Report of Investigations 4781*



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Salt Bath for Steel Billets

Bohn Aluminum Co. will use this neutral salt bath at the Air Force experimental plant in Adrian, Mich., to heat steel billets planned for press forging. Bath operates at 2350°F; its electric furnace has 5000-kw capacity. It holds 128,000 pounds of salt, kept neutral by four units of Park Chemical Co.'s Neutra-Gas

Plating Effects Tested

Investigation charts effect of chromium plating solutions on high strength steel

EFFECT of chromium plate, deposited from several different solutions, on the fatigue strength of steel was investigated in tests conducted by Prof. M. J. Sinnot, University of Michigan.

It has long been known that chromium plating reduces fatigue strength of high strength steels. Prof. Sinnot's work was calculated to further the knowldege of effects of this plating from various types of solution.

Tests were made on aircraft quality SAE 4130 steel heated to a hardness of Rockwell C40-41 and tensile strength of 185,000 psi. One set of unplated specimens was fatigue tested directly. All other sets were chromium plated in different solutions before testing.

Controlled Samples — Preparation prior to plating and current density and temperature during plating, were controlled closely. Fatigue limits were determined by standard R. R. Moore rotating beam method. The accompanying table summarizes Prof. Sinnot's conclusions.

Substantial Allowance—Until recently, ordinary chromium plating solution was used almost exclusively. This forced engineers designing components subject to alternate stress to make substantial allowance for decrease in fatigue strength attributable to the plate. Minimized effect of deposits from the CR-110 solutions should permit design of smaller, lighter sections.

For example, if a part is to be plated with 0.001-inch of chromium from an ordinary solution, it would be necessary to make the stress section area about 35 per cent heavier than that of an unplated piece for the same strength. Employing CR-110 solution, Dr. Sinnot reports the section would have to be increased about 8 per cent. Dr. Sinnot's work indicates also a higher safety factor from the CR-110 bath.

Chromium Plating Solution	Plate Thickness	Fatigue Strength* psi	Fatigue Strength Loss Due to Plating
None	Unplated	81,500	.....
CrO_3/SO_4	0.001"	60,500	25.7%
CrO_3/SO_4	0.010"	63,700	22.7%
S.R.H.S. CR-110	0.001"	75,300	7.6%
S.R.H.S. CR-110	0.010"	74,000	9.2%
S.R.H.S. CR-100	0.001"	75,200	7.7%
S.R.H.S. CR-100	0.010"	65,200	20.0%

* Based on original specimen diameter.

Converts Diesel's Torque

FACTORY - INSTALLED torque converters can be provided for six sizes of its industrial engines, according to Caterpillar Tractor Co., Peoria, Ill.

Diesels with converters are being used to power excavators, cranes, railroad switchers, drilling rigs, logging yarders and other equipment.

On heavy and varying loads, these torque converters allow engines to maintain a continuously high output. Turning effort is multiplied considerably at low output speeds. When loads are lifted or lowered, as in crane operation, the converter facilitates the pick up of a standing load or the braking of a load being lowered.

Cat diesel engines available with torque converters range from 70 to 500 brake horsepower.

With or Without Clutch — With the smaller, in-line engines, power can be delivered to the converters with or without a clutch, or with a clutch and reversing gear. Output arrangements include either a stub shaft or chain housing.

Converters for the three larger, V-type engines, may also be installed with or without a clutch. They may either be direct-coupled to the engine or chain driven. A stub shaft is provided on the output end of the converter.

Torque converters are twin disk models that use ordinary diesel fuel as hydraulic fluid, making it possible to attach a charging device that draws from the engine fuel supply. An independent cooling system is also offered.

How to Shield X-Ray Work

Primary facts and basic principles necessary for designing shielded x-ray installations are presented in a handbook, "X-Ray Protection Design," prepared by National Bureau of Standards. Material is based on recommendations of the National Committee on Radiation Protection.

BOLTS
Aircraft
Battery
Bicycle
Carriage
Connecting Rod
Cylinder Head
Dardelet
Elevator
Fitting-up & Boiler
Furniture
Hanger
Key
Lag
License Plate
Machine
Plier
Plow-cultivator
Ribbed
Sheathing
Skein
Spring Center
Step
Stove
Stud
Tire
Track
"U," "J," Eye & Hook
Weather Tight
Wheel

NUTS
Acorn
Aircraft
Castellated
Cold-forged
Cold punched
Hot pressed
Lamson Lock Nuts
Machine Screw
(square & hex)
Marsden
Semi-finished
Weld

PINS
Cotter
(steel, stainless, brass)
Clevis

SCREWS
Cap
Clutch Head
Lag
Lock Washer
Machine
Phillips Head
Spin lock
Tapping
Thumb

SPECIALTIES
Bent Products
Capped Bolts
Flat Spring Keys
Hinge Pins
Inserts, plastic
Lok-thred Studs
Pipe Plugs
Place Bolts
Plug Nuts
Rods
Sems
Spin Lock Screws
Studs—milled
Screw machine
products
Tinners Rivets
Washers
Wire Rope Clips
Wheel Wrenches

Many of these products are available in Carbon and Alloy Steel, Brass, Bronze, Stainless Steel, Monel Metal and Aluminum Alloys.
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STEEL
A PENTON PUBLICATION
June 16, 1952

GUIDE

FOR SELECTING TOOL STEELS AND CARBIDES

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About The Guide

LARGE PRODUCTION industry today revolves in a very real sense around the toolmaker. His job is obtaining and treating the necessary tools which will afford the highest quality production with attendant low tooling investment.

Selection is not easy. There are virtually thousands of different tool steels available from hundreds of manufacturers, agents, jobbers and importers.

This tool steel guide represents an effort by the editors of STEEL to make the job of selection an easier one. More than fifty companies are listed alphabetically. Under each company is a listing of the steels available.

First column shows the primary application for the steel. Scanning this column the user can pick the steel needed to perform a certain function. Index of materials by companies is an additional aid in this procedure. It shows at a glance which of the included companies handle steels for the various applications.

Second column shows the trade name of the steel and the method of hardening. Third column gives chemical analysis. Last column on the right tells suggested quenching medium, machinability annealed and the movement in hardening.

Trade name index permits rapid locating of any of the listed steels. Index gives listing where additional information on the steel is available.

Addresses of the companies are included to facilitate ordering from or contacting the company direct.

Breakdown of Primary Applications

CUTTING TOOLS (Finishing)—Box turner—Forming—Shaving—Parting — Reaming — Boring — Counterboring—Broaching—Gear cutting — Threading — Milling — Planing — Filing — Scraping—Circular shearing—Hollow milling

SHOCK RESISTING (Repeated Impact) — Bearing — Riveting — Backing up—Burring—Caulking—Chisels—Hammers—Swaging

SHOCK RESISTING (Intermittent Impact)—Dowel pins—Drifts —Pilots—Screw driving—Tool shanks

COLD WORK DIES (Blanking)—Blanking—Lamination—Notching—Trimming

COLD WORK DIES (Cold Forming)—Nut and bolt—Heading—Crowning and crimping—Thread and form rolling—Bulldozer —Stamping—Notching—Burnishing—Drawing—Coining—Wire, rod and tube drawing—Extruding—Swaging—Knurling—Powder compression—Embossing-jewelry etc.—Bending

PUNCHING AND SHEARING—Railroad tie-plate punches and dies—Railroad tie-plate shear blades—Structural shape shear blades and punches—Perforating punches and dies

HOT WORK DIES (Hot punching and shearing)—Railroad tie-plate hot punching and shearing—Railroad splice bar hot punching and shearing—Hot billet, bar and plate shears—Hot trimmer dies—Hot punches

HOT WORK DIES (Hot Forming) — Forging die inserts — Hot gripper and header dies—Hot compression dies—Hot extrusion dies—Hot bending dies—Hot swaging dies

PLASTIC MOLDING DIES (Hubbed Cavity Dies)

PLASTIC MOLDING DIES (Machine Cut Gravity Dies)

PLASTIC MOLDING DIES (Hubs)

PLASTIC MOLDING DIES (Ejector Pins)

DIE CASTING DIES—Molds—Trimming dies—Ejector pins

HIGH-STRESS AND HIGH-WEAR MACHINERY PARTS — Chuck jaws—Clutch pins—Collets and feed fingers—Clutch and chuck fingers—Quills—Stripper plates—Arbors—Drill bushings —Cams—Cam rolls—Centers—Mandrels—Spindles

GAGES — Plug — Ring—Snap—Thread plug—Thread ring— Best types of tool steels used for making gages are the manganese oil hardening, high carbon chrome, graphitic (oil hardening) and high speed.

Index of Materials by Trade Names

Companies Supplying These Materials are Indicated by Their Listing Number

	Listing No.
A-41	50
A-42	50
A-H5	6
Airaloy	40
Airdi 150	15
Air Hard	48
Air Hardening #30	40
Air Hardening #40	40
Airkool	15
Airloy	2
Airmold Die Casting	15
AirMold Plastic Mold	15
Airpro	7
Airque	10
Airvan	23
Alco M	47
Aldivan	32
Alhead	2
Alidie	50
Alva Extra	15
ALX	2
AMC	36
Amcoh	36
A. M. D.	19
Amutits	39
Annite No. 1	7
Annite No. 2	7
A020	36
Arrestite	40
Arrow Oil Hardening	9
Atha Pneu	15
Atlan	4
Atlan HCC	4
Atlantic 33	4
Atlantic Die	4
Atlas 93	2
Atlas A	2
Atlas Alpha 8	5
Atlas B	2
Atlas Die Casting Steel	5
Atlas Hobbing Iron	5
Atlas "Q"	5
Atlas Refined 8	5
Atlas Refined 10	5
Atlas Special Alloy 8	5
Atlas Spec. Alloy 10	5
Atlas X10	5
Atlas X12	5
Atlas XX95	5
Atlas XXX	5
Atloy Z	4
Atmodie	14
Auto	50
AW. Carbide	49
A. W. Special	23
B4	47
B-6	47
B6X	47
B-7	47
B-8	47
B-9	47
B-10	47
B44	47
B44J	47
B-47	2
Badger	5, 32
BA-H	6
B.D.C.	23
Best	6
Best Carbon	20
Best W. H.	9
Bethalloy	6
Beth, Hollow Drill	6
B-F High Speed	40
BFS	6
Bisco Tool Steel Tubing	7
Bismo 8-4-1	7
Bismo M-2	7
Bismo M-3	7
Black Diamond	15
Black Label	37
Blue Chip	23
Blue Edge	50
Blue Label	37, 42
Blue Streak 18-4-1	19
Blue Streak Moly	19
Bonded Carbide	10
Bonded Carbide Jr.	10
Bowco 7720	9
Bowco Non-Shrink	9
Braemow	10
Braevan	10
Brake Die	6
Brilliant	43
Broaching & Channeller	6
Brown Label	37
BTR	6
Buster	14
C55	25
C57	25
"C" Anneal	25
Cannon	16
Cannon Special	16
Carbon	7
Carbon Cold Header	32
Carbon Cold Header No-V	32
Carbon Cold Header + Mo	32
Carmet CA-1, Carbide	2
Carmet CA-2, Carbide	2
Carmet CA-3	2
Carmet CA-4	2
Carmet CA-5	2
Carmet CA-6, Carbide	2
Carmet CA-7	2
Carmet CA-8	2
Carmet CA-10	2
Carmet CA-11, Carbide	2
Carmet CA-12, Carbide	2
Carmet CA-20, Carbide	2
Carmet CA-51	2
Carvan	7
Cascade	32
Case-Hardening	12
Castdie	14
CC	39
C-C	40
C.C.M.	42
C. C. S.	15
C. E. C. Impact	14
Cello	34
Cesco Special	13
C. F. S.	32
Champion Non-changeable	15
Checkno No. 1	7
Checkno No. 2	7
Checkno No. 3	7
Chimo Punch	23
Chrome Hot Die	42
Chro-Mow	15
C.H.W.	32
Circle C	23
Clarite	14
C.L.W.	32
CMW	36
CNS-1	29
CNS-2	29
Cobalt	10
Cobalt Chrome	32
Cobalt High Speed	40
Cold Hot	20
Colonial No. 6	48
Colonial No. 7	48
Colonial No. 14	48
Colosso	26
Commando 47	42
Como	10
Comokut	6
Congo	10
Corinth	2
Crasco Black Label	18
Crasco Green Label	18
Crasco Red Label	18
Crasco Special Vanadium	18
Crasco Yellow Label	18
Crescent Special	15
Crescent Tool Sheet	15
Crocar	48
Crodi	5

TRADE NAME INDEX

	Listing No.
Croloy	20
Cromair	40
Cromo	7
Cro-Mo-Loy	5
Cr-Mo-V	6
Cromovan Die	23
Cr Mo W	6
Cromva	7
Crow	2
Crown	32
Crown W	9
Crucible Double Special	15
Crusca 12B	15
Crusca Cold Hubbing	15
CSM #2	15
Cuprodie	22
CV	16
C-V	40
Cyclops 67	47
Cyclops Special	47
C.Y.W.	23
D-6-Co	20
D-9-Mo	20
D-9-Va	20
D29	20
Darwin 93	16
Darwin 505	16
Darwin 505 Special	16
Darwin M-3	16
Darwin #1	16
Darwin 1366	16
Darwin Brake Die	16
Darwin Flame Hard	16
DBL-2	2
DBL-3	2
Del-teel Alloy	17
Demmler D	23
Denine	5
Deward	2
Diamond M	23
Diamond S	42
DICA B	29
Di-Mol	20
D.N.Y. Hot Work	42
Double Seven	36
Double Six	36
Draco	47
Dumore	52
Dumost #1	40
Dumost #2	40
Dumost #3	40
Duramold A	6
Duramold B	6
Duramold C	6
Duramold N	6
Durax	43
Duredge	9
Duro Hi Sp	34
Durodi	22
Dycast No. 1	32
Dykrome	3
Dymal	3
E, Carbide	49
EB Alloy	2
EE	16
EE, Carbide	49
EH, Carbide	49
E.H.W. No. 1	32
EIS H5	25
EIS H41	25
EIS H720	25
EIS R43	25
EIS R97	25
EIS R718	25
EIS T51	25
EIS T73	25
EIS T77	25
EIS T721	25
EIS V2	25
EIS V3	25
EK-81	47
Elastuf 44	38
Elastuf Type A2	38
Electrite #1	32
Electrite #19	32
Electrite Co-6	32
Electrite Cobalt	32
Electrite Double Six M-2	32
Electrite HV-6	32
Electrite Lacomo	32
Electrite MV 1	32
Electrite MV 2	32
Electrite MV 3	32
Electrite MV 4	32
Electrite No. 5	32
Electrite No. 7	32
Electrite Super Cobalt	32
Electrite Tatmo	32
Electrite T.N.W.	32
Electrite U	32
Electrite UB	32
Electrite Ultra Cobalt	32
Electrite Vanadium	32
EM, Carbide	49
E. S. A.	32
E.V.M.	48
Exidie	14
Extra	10, 14, 50
Extra Carbon	20, 32, 40
Extra Header Die	14
Extra Rapid 300	39
Extra Tough & Hard	39
EZ9W	9
EZ14W	9
EZ-Die	14
E-3, Carbide	51
E-5, Carbide	51
E-6, Carbide	51
E-8, Carbide	51
E13, Carbide	51
E-18, Carbide	51
E-25, Carbide	51
F	22
Falcon 4	5
Falcon 6	5
Fast Finishing	40
FCC 6 Forgings	2
FCC 5X1 Cast-to-Shape	2
FCC 5X1 Forgings	2
FCC 14 Forgings	2
FCC 16B Cast-to-Shape	2
FCC 19	2
FCC 22 Forgings	2
FCC 55 Cast-to-Shape	2
FCC 66 Forgings	2
FCC 66 Cast-to-Shape	2
FCC Air Hardening Cast-to-Shape	2
FCC Air Hardening Forging	2
FCC Cast Tool Steel	2
FCC Chrome Vanadium Cast-to-Shape	2
FCC CMS Cast-to-Shape	2
FCC Flamhard Cast-to-Shape	2
FCC Oil Hardening Cast-to-Shape	2
FCC Roloy #2 Cast-to-Shape	2
FCC Roloy Cast-to-Shape	2
FCC TMS Cast-to-Shape	2
Firedie	14
Firex Special	16
Firthite H, Carbide	23
Firthite HA, Carbide	23
Firthite HB, Carbide	23
Firthite HC, Carbide	23
Firthite HE, Carbide	23
Firthite HF, Carbides	23
Firthite ND20, Carbide	23
Firthite ND25, Carbide	23
Firthite TA Carbide	23
Firthite TO4, Carbide	23
Firthite T04, Carbide	23
Firthite T16, Carbide	23
Firthite T31, Carbides	23
Firthite T41H, Carbide	23
Firthite T66, Carbide	23
Firthite T83, Carbide	23
Firthite T89, Carbide	23
Fisco Carbon	21
Fisco Chromdie	21
Fisco Duplex	21
Fisco High Speed	21
Fisco Oilhard	21
Fisco Omego	21
Fisco Special	21
FNS	5
Forge-Die	48
Formaloy	9
Formite	14
Formite #2	14
Formold	15
Fort Pitt	50
FS	22
FS2-5	23
F. S. Best	23
F. S. Extra	23
FS Extra CHQ	23
F. S. Special	23
Fuego	26
FX	22
Globe Drill Rod	23
Grade "A"	19
Grade A, Carbide	1
Grade AA, Carbide	1
Grade B, Carbide	1
Grade BB, Carbide	1
Grade C, Carbide	1
Grade CC, Carbide	1
Grade D, Carbide	1
Grade DD, Carbide	1
Grade GG, Carbide	1
Grade HD-15, Carbide	1
Grade HD-20, Carbide	1
Grade HD-25, Carbide	1
Graph-Al	36, 37, 45
Graph M.N.S.	37, 45
Graph-Mo	36, 37, 45
Graph-Tung	36, 37, 45
Gray Label	37
Green Label	37
Gripmore No. 1	7
Gripmore No. 1-V	7
Gripmore No. 2	7
G. S. N.	32
H-9 Extra	12
H Brand	16
H & R Brake Die	27
H & R Carbon	27
H & R Cobalt	27
H & R Cobalt Moly	27
H & R Gold Label	27
H & R Heading Die	27
H & R Hot Work	27
H & R Hot Work No. 2	27
H & R Hot Work No. 4	27
H & R Hot Work No. 5	27
H & R Hot Work No. 6	27
H & R Hot Work No. 7	27
H & R Hot Work No. 12	27
H & R Hot Work No. 15	27
H & R K	27
H & R K-2	27
H & R K-2L	27
H & R K-3	27
H & R Multimold	27
H & R Moly Van	27
H & R Molyhi	27
H & R N150	27
H & R No. 1	27
H & R No. 2	27
H & R No. 3	27
H & R No. 4	27
N & R No. 7	27
H & R No. 8	27
H & R No. 8M	27
H & R No. 15	27
H & R No. 19	27
H & R No. 44	27
H & R No. 45	27
H & R No. 48	27
H & R No. 50	27
H & R No. 55	27
H & R No. 57	27
H & R No. 59	27
H & R No. 60	27
H & R No. 61	27
H & R No. 80	27
H & R No. 85	27
H & R No. 88	27
H & R No. 225	27
H & R No. 434	27
H & R No. 444	27
H & R No. 445	27
H & R No. 488	27
H & R No. 550	27
H & R No. 555	27
H & R Oil Hardening	27
H & R Piston	27
H & R Plastic Mold	27
H & R Plastic Mold B	27
H & R Plastic Mold C	27
H & R Special Carbon	27
H & R Special Heading Die	27
H & R Super Cobalt	27
H & R Super Molyhi	27
H & R Tungsten Oil Hardening	27
H & R Vanadium	27
Halcomb 218	15
Halcomb TM	15
Halvan	15
Hampden	12
Hardrite	50
Hardtem	25
Hargus	52
Hastelloy Alloy C	24
Havoc	42
Hecla	50
Hevimet	11
Hi-Car-Hi, Ch.	34
Hicro	19
Hi-Mo	23
Hi-Mo-V	23
High Production	36
HM High Speed	6
Hobalite	16, 52
Hoballoy	15
Hobbing Die Steel (Low C)	6
Hobrite	43
Hodi	5
Hollobar	19, 37
Hollow Drill	6
Hotform	48
Hotform No. 3	48
Hot Work Blue Chip	23
HSC 6-6-2	28
HSC 18-4-1	28
HSC-33	28
HSC-265	28
HSC 280	28
HSC-310	28
HSC-313	28
HSC-350	28
HSC-422	28
HSC-515	28
HSC Cobalt 5	28
HSC Cold Header Die Steel	28
HSC-CVM	28
HSC-CW-OIL	28
HSC Regular	28
HSC Special	28
HSC-SS-Extra	28
HSC-Vancro	28
Huron	2
Huron V	2
H. V. Blue Chip	23
HW 8	6
HWA	16
H.W.D.	23
HWS	16
HYCC	15
Hyco	36
Hy Pro	43
Hypro A	7
Hypro B	7
Hypro 61 HCHC	9
Hypro 62 HCHC	9
Hypro 63 HCHC	9
Ideor	16
Impacto	5
Invar	32
Invaro	23
IWI	16
IXL	40
J Hot Work	29
JJ Hot Work	29
J.S. Punch	23
Kalkos	32
Keewatin	5
Kennametal K1, Carbide	30
Kennametal K2S, Carbide	30
Kennametal K3H, Carbide	30
Kennametal K4H, Carbide	30
Kennametal K5H, Carbide	30
Kennametal K6, Carbide	30
Kennametal K8, Carbide	30
Kennametal K12, Carbide	30
Kennametal K82, Carbide	30
Kennametal K84, Carbide	30
Kennametal K86, Carbide	30
Kennametal K90, Carbide	30
Kennametal K91, Carbide	30
Kennametal K92, Carbide	30
Kennametal K94, Carbide	30
Kennametal K95, Carbide	30
Kennametal K96, Carbide	30
Kennametal KE7, Carbide	30
Kennametal KM, Carbide	30
Kentanium	30
Ketos	15
Keystone	20
King Cobalt	29
Kinite	8
Kiski	10
KL	47
Kloster Swed-O-1	31
KM	47
K.R.	50
Kropunch	3
Krotung	3
KS	47
Kutkwik	20
K-W	12
LaBelle Cold Striking Die	15
LaBelle Extra	15
LaBelle Silicon #2	15
Lehigh-H	6
Lehigh-L	6
Lehigh-S	6
Lion	29
Lion Extra	29
LMW	2
Lockport Special	42
L. P. D.	32
L. T. Forging Die	23
Ludlum 602	2
Ludlum 609	2
Lumdie	32
LXX	2
M-10-Air Hard	34
M Chrome	32
Macco 33	33
Macco 35 Air Hard	33
Macco 99	33
Macco B-29	33
Macco Enormous	33
Macco Foolproof	33
Macco Hardtuf	33
Macco Hobomold	33
Macco Hollow Bar Tubing	33
Macco Kromax 1	33
Macco Kromax 2	33
Macco Lers Mould	33
Macco M L	33
Macco N L S	33
Macco P-125	33
Macco P-150	33
Macco P-175	33
Macco Radio	33
Macco Royal Crown	33
Macco S'l. Mang.	33
Macco Special	33
Macco Super Moly	33
Macco Superior	33
Magic	29
Major	36
Mangano	32
Mansil	20
Maple Leaf	5
Marvel	48
Maxite	14
McInnes Folder-Die	34
McInnes Special	34

	Listing No.
Meteor	23
M. G. R.	32
Milo	26
Milvan	36
Mineor	16
Mirromold	12
Misco A	34
Misco B	34
ML	2
MM6&6	36
Mo Chip	23
Mocut	10
Mogul	29
Mohawk	2
Mohican	5
Molite	14
Molite HW 10	14
Molva-T	42
Moly Hi Sp	34
Monark 2	5
Mo-Rapid Extra 3	39
Mosil	48
Motung	47
Motung 652	47
Movan	47
MSM	36
MT-6	16
M-Tungsten	40
Multimold	6
Mustang	29
MY Extra	39
MYA	27, 39
NBS	39
N. D. S.	32
Neatro	48
Neor	16, 52
New Process Cold Header	29
Ni Cr Hobbing	6
Nicroman	20
Nikro M	48
Nipigon	5
Nitrard No. 1	23
NN	5
No. 4 Cold Header	9
No. 11 Special	12
No. 158	12
No. 484	12
No. 610	12
No. 883	12
No. 844	20
No. 871	20
No. 872	20
No. 873	20
Non Pa Reil	43
Non-Shrink	50
Non-Tempering	6
Novo Superior	8
Nu Die V	15
Ohio Die	48
OHT	16
Oil Hardening	50
Oildie	14
Oilgraph	2
Oiltemp	7
Oilway	8
Olympic	32
Omega	6
Ontario	2
Orange Label	36
Orion	47
Panther 5	2
Panther Special	2
Par-Exc	48
Peerless A	15
Peerless LCT #2	15
Pen Air #5	37
Pen-Hob	37
Penco A C S	37
Penco Brake Die	37
Penco Cr-Mo-V	37
Piston	6
Plancher	52
Plastalloy	20
Plastic CSM #2	15
Plastic Die	40, 50
Plastiron	20
Polaris	20
Pompton	2
Potomac	2
Potomac M	2
Powhatan	5
Presneal	25
Pressuredie 1	10
Pressuredie 2	10
Pressuredie 3	10
Prestem	25
PRK-33	16, 52
Pure-Ore Air-Chrom	31
Pure-Ore Chiz-Alloy	31
Pure-Ore Clipper	31
Pure-Ore Cobalt	31
Pure-Ore D-C-33	31
Pure-Ore D-C-66	31
Pure-Ore En-97	31
Pure-Ore Extra	31
Pure-Ore Finishing	31
Pure-Ore Hi-Run	31
Pure-Ore KLS-44	31
Pure-Ore No. 14	31
Pure-Ore No. 25	31
Pure-Ore Prior	31
Pure-Ore Rolmo	31
Pure-Ore Special	31
Pure-Ore Standard	31
Pure-Ore Super Alloy	31
Purple Label	29
Purple Label Extra	29
Pyroneal	25
Pyrotem	25
Python	2
Q. A.	50
Rapid Finishing	29
R. D. S.	12
Record "A"	34
Record 66	9
Record Eminent	9
Record Star	9
Record Superior	9
Red Chip	23
Red Cut Cobalt	48
Red Cut Cobalt B	48
Red Cut Superior	48
Red Cut Superior J	48
Red Indian	5
Red Streak	42
Red Tiger	6
Regal	50
Rema	28
Remalloy	28
Renown	32
Resco	40
Rex AA	15
Rex AAA	15
Rex 4V	15
Rex 95	15
Rex 440	15
Rex M-2	15
Rex M3	15
Rex M-25	15
Rexalloy	15
Rex Supercut	15
Rex Supervan	15
Rex TMO	15
Rex VM	15
RTS	29
R. T. Steel	23
Ry-Alloy	41
Ry-Die	41
Sagamore	2
Samson Extra	12
Sanderson Extra	15
Saratoga	2
SC Special	48
Select B	32
Select M	32
Seminole Medium	2
Seminole Hard	2
Seneca	5
Sheildie	22
Silicarb	7
Silimo	7
Silman	48
Silvan Star	23
Silver Die No. 1	23
Silver Die No. 2	23
Silver Hardtem	25
Silver Label	37
Silver Star	23
Simonds Airtrue	42
Sixix	5
Solar	12
Solid Drill	6
Sparta	47
Sparta 80	47
Spartan 5	5
Spartan 7	6
Special	10, 14, 50
Special 18	9
Special A.S.V.	23
Special Auto-A	40
Special Auto-D	40
Special Carbon	32, 40
Special Chr. Nick	34
Special HS	6
Special K5	39
Special KN	39
Special KR	39
Special M-O	40
Special Oil Hardening	29, 40
Special Punch	40
Special Vanadium	50
Special Very Hard	39
Special XX	23
Speed-Cut	48
Speed Star	12
SS Tool	15
SSC	16
Stainless M. S. No. 2	12
Staminal	32
Standard	9, 14, 20
Standard Carbon	32, 40
Standard Chisel	16
Star Blue Chip	23
Star Columbium	12
Star-Mo M2	23
Star-Zenith	12
Stellite #3 Alloy	24
Stellite #19	24
Stellite 98M 2 Alloy	24
Stellite Alloy No. 6	24
Stellite Alloy No. 12	24
Stellite Star J-Metal Alloy	24
Stentor	12
Ster M	23
Sterling	23
Sterling V	23
Sterling XX	23
S.T.M.	42
Super	50
Super Cesco	13
Super DBL	2
Super High Speed	52
Super Hi-Mo	23
Super Mo Chip	23
Super Motung	47
Super Panther	2
Super Rapid Extra	39
Super Rapid Extra 500	39
Super Rapid Extra Mo	39
Super Samson	12
Super Star-Mo	23
Super Tiger	7
Superb	32
Superdie	14
Superior	6, 34
Superior 1	10
Superior 3	10
Supremus	29
Supremus Extra	29
Suprimpacto	5
T-Alloy	10
T-Alloy "A"	10
T-Alloy "B"	10
T-Alloy "C"	10
Talide C-88, Carbide	35
Talide C-89, Carbide	35
Talide C-91, Carbide	35
Talide C-93, Carbide	35
Talide C-7525, Carbide	35
Talide C-8020, Carbide	35
Talide C-8515, Carbide	35
Talide S-88, Carbide	35
Talide S-90, Carbide	35
Talide S-92, Carbide	35
Tantung G	49
TCM	50
Teenax No. 46	42
Temper Tough	16
Tennessee Special	44
Thermodie HW	6
Thermold A	47
Thermold AV	47
Thermold B	47
Thermoneal	25
Thermotem	25
Thor	47
Tiger Brand	7
Tiger Special	7
Tiger Van	7
Tioga	2
T-K	12
TM-6	50
Top Notch	29
Tough H	6
Tough M	6
Tri-Mo	46
Triple Die	23
Triton	10
Trojan	5
Trojan #8 (Unannealed)	38
Trojan #9½ (Annealed)	38
T.R.S.	3
Truform	29
Tuncro	4
Tungsten Hack	20
Twin Mo	8
Twinvan	10
Typlex	52
UA-4	40
UA-6	40
UA-8	40
UHB	46
UHB-46	46
UHB-151	46
UHB-711	46
UHB Forma	46
UHB Orvar 2	46
Ultimo 6	5
Ultradie #1	47
Ultradie #2	47
Ultradie #3	47
Unico	26
Unicut	47
Uniloy 1435	47
Uniloy 1860	47
US Ultra	39
Utex	19
Utica	2
V 6 N	39
"V" Hi. Sp.	34
Vairloy	50
Van. Cruc.	34
Vanadium Extra	14
Vanadium Standard	14
Vanadium Type BB	48
Vanadium Type D	48
Vanadium Type G	48
Vanadium Type H	48
Vanadium Type K	48
Vanadium Type N	48
Van Chip	23
Van Chip (Mod.)	23
Vanite	14
Van-Lom	48
Vasco M-2	48
Vasco Supreme	48
Va-Tool	20
VD	41
V.D.C.	32
VD Chisel Steel	41
Vega	12
Venango Special	47
Veri Best Drill Rod	19
Very Best W. H.	9
V-HW	40
Vibro	10
Victor Drill Rod	15
Vinco	10
VLM	2
Vulcast	50
Vuldie	50
Vulmold	50
W Brand	16
Wando	47
Washington	29
Waterdie Extra	14
White Label	37, 43
Windsor	29
Wizard	52
WKZ	39
Woco	7
Wolfram	50
Wolfram Cobalt	50
Wolva	32
W. T.	32
X	6
XCL	6
XDH	23
XDL	23
XDM	23
X.L. Chisel	32
XX	6
XX-Superior	40
XXX	6
Yellow Label	37, 43
Zivan-45	52
Z.T.M.	32
2A1, Carbide	49
2A3, Carbide	49
2A5, Carbide	49
2A68, Carbide	49
2A7, Carbide	49
2B-HC	29
2B-LC	29
2B-MC	29
2V72	25
2V90	25
3-C Special	29
4-HW	50
5H50	25
6-H-W	40
6-HW	50
6N6-M2	20
8-N-2	48
10-H-W	40
30 Calo Ferro	50
37% Cobalt Magnet	32
44A, Carbide	11
45 Calo Ferro	50
55A, Carbide	11
55B, Carbide	11
57 HW	6
57 HW Special	6
66 HS	6
67 Chisel	6
67 Tap	6
71 Alloy	6
77B, Carbide	11
78, Carbide	11
78B, Carbide	11
78C, Carbide	11
190, Carbide	11
404	40
509, Carbide	51
550	40
606, Carbide	51
608, Chrome Carbide	11
710, Carbide	51
779, Carbide	11
812 Die	20
831, Carbide	11
883, Carbide	11
905, Carbide	11
907, Carbide	11
945, Carbide	51
999, Carbide	11
3074 Hot Work	36
4870	50

Index of Materials by Companies

Products are available for the primary application indicated by an (x) in this table opposite company's name. For more specific information see company's complete listing on page indicated.

LISTING NUMBER and COMPANY	PAGE NO.	PRIMARY APPLICATIONS FOR WHICH PRODUCTS ARE LISTED									CAST TYPE	CARBIDES
		Cold Work Dies	Cutting Tools	Die Casting Dies	Gages	Hi-Stress Non-Wear Mach'y Parts	Hot Work Dies	Plastic Mold Dies	Punching and Shearing	Shock Resisting		
1—Adamas Carbide Corp.	S-6		X									X
2—Allegheny Ludlum Steel Corp.	S-6	X	X	X	X	X	X	X	X	X	X	X
3—Amalgamated Steel Corp.	S-8	X	X		X		X		X			
48—Anchor Drawn Steel Co.	S-30	X	X	X	X	X	X	X	X	X		
4—Atlantic Steel Corp.	S-8	X							X	X		
5—Atlas Steels Ltd.	S-8	X	X	X			X	X	X	X		
6—Bethlehem Steel Co.	S-9	X	X	X			X	X	X	X		
7—Bissett Steel Co.	S-10	X	X	X			X		X	X		
8—H. Boker & Co. Inc.	S-10	X	X				X					
9—Boyd-Wagner Co.	S-11	X	X				X		X	X		
10—Braeburn Alloy Steel Div.	S-11	X	X	X			X	X		X		
11—Carboloy Dept., G. E. Co.	S-12	X	X			X	X		X	X		X
12—Carpenter Steel Co.	S-12	X	X	X	X	X	X	X	X	X		
13—Cesco Electric Co.	S-13									X		
48—Colonial Steel Co.	S-30	X	X	X	X	X	X	X	X	X		
14—Columbia Tool Steel Co.	S-13	X	X	X			X	X	X	X		
15—Crucible Steel Co. of America	S-13	X	X	X	X		X	X	X	X	X	
16—Darwin & Milner Inc.	S-15	X	X				X	X	X	X		
17—Delaware Tool Steel Corp.	S-15								X			
18—Detroit Steel Corp.	S-16	X			X			X	X	X		
19—Diehl Steel Co.	S-16	X	X				X		X			
20—Henry Disston & Sons Inc.	S-16	X	X	X			X	X	X	X		
21—Faitoute Iron & Steel Co. Inc.	S-17	X	X							X		
22—A. Finkl & Sons Co.	S-17						X		X			
23—Firth Sterling Inc.	S-17	X	X	X			X		X	X		X
24—Haynes Stellite Co.	S-19		X				X		X		X	
25—Heppenstall Co.	S-19	X		X			X	X	X			
26—Hidalgo Steel Co. Inc.	S-19		X						X	X		
27—Houghton & Richards Inc.	S-20	X	X	X			X	X	X	X		
28—Hoyland Steel Co. Inc.	S-21	X	X	X			X	X		X		
29—Jessop Steel Co.	S-22	X	X	X	X		X		X	X		
30—Kennametal Inc.	S-22	X	X									X
31—Kloster Steel Corp.	S-22	X	X				X			X		
32—Latrobe Electric Steel Co.	S-23	X	X	X			X	X		X		
33—P. F. McDonald & Co.	S-24	X	X	X			X	X	X	X		
34—McInnes Steel Co.	S-25	X	X	X			X					
35—Metal Carbides Corp.	S-25	X	X						X	X		X
36—A. Milne & Co.	S-25	X	X	X	X	X	X	X	X	X		
37—Peninsular Steel Co.	S-26	X		X	X			X	X	X		
38—Horace T. Potts Co.	S-27			X		X		X	X			
39—Raven Steel & Tool Co.	S-27	X	X	X			X	X	X	X		
40—Republic Steel Corp.	S-27	X	X	X			X	X	X	X		
41—Joseph T. Ryerson & Son Inc.	S-28	X						X	X			
42—Simonds Saw and Steel Co.	S-28	X	X				X			X		
43—Swedish-American Steel Corp.	S-29	X	X					X				
44—Tennessee Coal and Iron Div.	S-29		X			X			X	X		
45—Timken Roller Bearing Co.	S-29	X				X			X			
46—Uddeholm Co. of America Inc.	S-29	X		X			X	X	X	X		
47—Universal-Cyclops Steel Corp.	S-29	X	X	X			X	X	X	X		
48—Vanadium-Alloys Steel Co.	S-30	X	X	X	X	X	X	X	X	X		
49—Vascoloy-Ramet Corp.	S-31		X							X		X
50—Vulcan Crucible Steel Co.	S-31	X	X	X	X	X	X	X	X	X		
50A—Wesson Co.	S-32		X							X		X
51—Willey's Carbide Tool Co.	S-32		X							X		X
52—Ziv Steel & Wire Co.	S-32	X	X		X	X	X	X	X	X		

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium ★ % Machinability Annealed Movement in Hardening.

ADAMAS CARBIDE CORP., 1000 S. Fourth St., Harrison, N. J. — Listing No. 1

Cutting Tools (Finishing)	GRADE A, Carbide	Low cobalt content tungsten carbide	
Cutting Tools (Finishing)	GRADE AA, Carbide	Low cobalt content tungsten carbide	
Cutting Tools (Finishing)	GRADE CC, Carbide	Low cobalt content tungsten titanium carbide	
Cutting Tools (General Purpose)	GRADE B, Carbide	Medium cobalt content tungsten carbide	
Cutting Tools (General Purpose)	GRADE C, Carbide	Low cobalt content tungsten titanium carbide	
Cutting Tools (Roughing)	GRADE BB, Carbide	Medium cobalt content tungsten carbide	
Cutting Tools (Roughing)	GRADE D, Carbide	Medium cobalt content tungsten titanium carbide	
Cutting Tools (Roughing)	Grade DD, carbide	Medium cobalt content tungsten titanium carbide	
Wear and Impact	Grade HD-15, carbide	Medium cobalt content tungsten carbide	
Impact (Medium)	Grade HD-20, carbide	High cobalt content tungsten carbide	
Impact (Heavy)	Grade HD-25, carbide	High cobalt content tungsten carbide	
Wear and Acid Resistant	Grade GG, Carbide	Medium cobalt content tungsten tantalum carbide	

ALLEGHENY LUDLUM STEEL CORP., 2020 Oliver Bldg., Pittsburgh 22, Pa. — Listing No. 2

Bushings (Cold Work, Forming Dies and Gages)	OILGRAPH Graphitic Oil Hardening	C 1.35, Mn 1.00, Cr .25, Mo .25, Si 1.35	Oil Mach. 125 Movement + A
Bushings (Pneumatic chisels, Air Gun Bushings)	LUDLUM 602 Water, Oil Hardening	C .50, Mn .70, Mo .40, V .10, Si 1.70	Water, Oil Mach. 85 Movement —C
Carbon Drills, Reamers	CROW Water Hardening	C 1.20, Mn .25, Cr .50, Si .25	Water Mach. 100 Movement —C
Cold Forming Dies	CARMET CA-12, Carbide		
Cold Header Dies	CARMET CA-11 ,Carbide		
Cold Header Dies	CARMET CA-20, Carbide		
Cold Header Dies	POMPTON Water Hardening	C .90-1.00	Water Mach. 100 Movement —C
Cold Header Dies	PYTHON Water Hardening	C .90, Mn .30, V .25, Si .25	Water Mach. 85 Movement —C
Cold Work (Dies, Rolls, Cams, etc.)	ALHEAD Water Hardening	C 1.00, W 1.50, Co 1.50	Water Mach. 80 Movement C
Cold Work (Dies, Rolls, Cams, etc.)	FCC Air Hardening Cast-to-Shape Air Hardening	C 1.50, Mn .40, Cr 12.00, Mo .80, V .50, Co .75, Si .40	Still Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FCC Air Hardening Forging Air Hardening	C 1.50, Mn .40, Cr 12.00, Mo .80, V .50, Co .75, Si .40	Still Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, etc.)	FCC ROLOY Cast-to-Shape Air Hardening	C 1.50, Mn .40, Cr 12.00, Mo 1.15, V .50, Co .75, Si .40	Still Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FCC 66 Cast-to-Shape Air Hardening	C1.50, Mn .40, Cr 12.00, Mo .95, V .50, Co 3.25, Si .40	Still Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FCC 66 Forgings Air Hardening	C 1.50, Mn .40, Cr 12.00, Mo .95, V .50, Co 3.25, Si .40	Still Air Mach. 50 Nonshrink
Cold Work (Punch and Shock)	FCC 22 Forgings Oil Hardening	C .50, Mn .25, Cr 1.30, W 2.25, V .25, Si .30	Oil Mach. 85 Movement A
Cold Work (Tools, Dies, Rolls—up to 600°)	FCC 55 Cast-to-Shape Air Hardening	C 1.50, Mn .40, Cr 12.00, Mo .95, V .50, Co 2.00, Si .40	Still Air Mach. 50 Nonshrink
Cold Work Dies	AIRLOY Air Hardening	C 1.00, Mn 3.00, Cr 1.00, Mo 1.00, Si .25	Air Mach. 60 Movement + A
Cold Work Dies (Blanking)	CARMET CA-10, Carbide		
Cold Work Dies (Blanking)	CARMET CA-11, Carbide		
Cold Work Dies (Blanking, Long Runs)	HURON Oil Hardening	C 2.00, Mn .25, Cr 12.00, V .80, Si .25	Oil Mach. 45 Movement + A
Cold Work Dies (Brick Molds)	HURON V Air, Oil Hardening	C 2.50, Cr 12.00, Mo .80, V 4.00	Air, Oil Mach. 40 Movement A
Cold Work Dies (Blanking, Forming)	FCC Oil Hardening Cast-to-Shape Oil Hardening	C .90, Mn 1.15, Cr .50, W .50, V .25, Si .25	Oil Mach. 90 Movement B
Cold Work Dies (Blanking, Forming)	FCC ROLOY #2 Cast-to-Shape Air Hardening	C 1.00, Mn .35, Cr 5.25, Mo 1.15, V .50, Si .35	Air Mach. 65 Movement A
Cold Work Dies (Blanking, Forming)	UTICA Water, Oil Hardening	C 1.25, Mn .30, Cr .40, W 1.40, V .20, Si .35	Oil, Water Mach. 65 Movement + A
Cold Work Dies (Blanking, Forming, Long Runs)	ONTARIO Air Hardening	C 1.50, Mn .35, Cr 12.00, Mo .80, V .25, Si .30	Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Forming, Short Runs)	DEWARD Oil Hardening	C .90, Mn 1.50, Mo .30, Si .25	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Forming, Short Runs)	SAGAMORE Air Hardening	C 1.00, Mn .50, Cr 5.00, Mo 1.00, V .25, Si .25	Air Mach. 65 Movement A
Cold Work Dies (Blanking, Forming, Short Runs)	SARATOGA Oil Hardening	C .90, Mn 1.20, Cr .50, W .50, Si .35	Oil Mach. 85 Movement + A
Cold Work Dies (Blanking, Forming, Jigs and Fixtures)	TIOGA Oil Hardenings	C .70, Mn .60, Si .25, Cr .65, Ni 1.50, Mo .15	Oil Mach. 75 Movement + B
Cold Work Dies (Inserts, Machine Parts)	FCC Cast Tool Steel	C .90, Mn .50, Si .30	Should not be Hardened Mach. 90
Cold Work Dies (and Machine Parts)	FCC FLAMHARD Cast-to-Shape Oil Hardening	C .50, Mn 1.15, Cr 1.20, Mo .40, V .10, Si .50	Oil Mach. 85 Movement B
Cutting Tools (Finishing)	ALX Cast Alloy	C 2.00, Cr 33.00, W 17.00, Co 40.00	
Cutting Tools (Finishing—Cast Iron, Nonferrous, Nonmetallics)	CARMET CA-4 Carbide		
Cutting Tools (Finishing—Nonferrous, Nonmetallics)	CARMET CA-7 Carbide		
Cutting Tools (Finishing—Nonferrous, Nonmetallics)	CARMET CA-8 Carbide		
Cutting Tools (Finishing Steel)	CARMET CA-2, Carbide		
Cutting Tools (Heavy Rough Cuts—Cast Iron)	CARMET CA-51 Carbide		
Cutting Tools (Precision Finishing Steel)	CARMET CA-6, Carbide		
Cutting Tools (Roughing)	PANTHER SPECIAL High Speed	C .75, Mn .25, Cr 4.00, W 19.00, V 1.00, Co 5.00, Si .25	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing)	PANTHER 5	C 1.50, Cr 4.75, W 12.50, Va 5.00, Co 5.00	Oil, Air, Salt Mach. 40 Movement A

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Roughing)	SUPER DBL High Speed	C .80, Mn .40, Cr 4.00, W 5.50, Mo 4.25, V 1.75, Co 7.75, Si .40	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing)	SUPER PANTHER High Speed	C .80, Mn .25, Cr 4.00, W 19.00, Mo .75, V 2.00, Co 7.00, Si .25	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing—Cast Iron, Nonferrous, Nonmetallics)	CARMET CA-3 Carbide		
Cutting Tools (Heavy Interrupted Roughing)	CARMET CA-5 Carbide		
Cutting Tools (Roughing Steel)	CARMET CA-1, Carbide		
Cutting Tools (Roughing, Finishing)	DBL-2 High Speed	C .80, Mn .25, Cr 4.00, W 6.00, Mo 5.00, V 1.75, Si .30	Oil, Air Mach. 55 Movement +A
Cutting Tools (Roughing and Finishing)	DBL-3	C 1.15, Cr 4.00, W 6.00, Mo 5.50, Va 3.00	Oil, Air, Salt Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	LMW High Speed	C .80, Mn .25, Cr 4.00, W 1.50, Mo 8.00, V 1.00, Si .30	Oil Mach. 55 Movement +A
Cutting Tools (Roughing, Finishing)	LXX High Speed	C .70, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .25	Oil, Air Mach. 50 Movement +A
Cutting Tools (Roughing, Finishing)	ML High Speed	C .80, Mn .30, Cr 4.00, W 18.00, Mo .75, V 2.00, Si .30	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing, Finishing)	VLM High Speed	C .85, Mn .30, Cr 4.00, Mo 8.00, V 2.00, Si .30	Oil Mach. 55 Movement +A
Die Casting Dies	FCC 6 Forgings Oil Hardening	C .37, Mn .80, Cr .95, V .17, Si .30	Oil Mach. 85 Movement B
Die Casting Dies	POTOMAC M Oil, Air Hardening	C .35, Mn .35, Si 1.10, Cr 5.25, Mo 1.25, V 1.00	Oil, Air Mach. 10 Movement —A
Draw Dies	CROW (Listed Above) Water Hardening	C 1.20, Mn .25, Cr .50, Si .25	Water Mach. 100 Movement C
Draw Dies	ONTARIO (Listed Above)		
Gages	CARMET CA-4 Carbide		
Gages	CARMET CA-8 Carbide		
Gages	DEWARD (Listed Above)		
Gages	ONTARIO (Listed Above)		
Gages & Machine Parts	FCC Oil Hardening Cast-to-Shape Oil Hardening	C .90, Mn 1.15, Cr .50, W .50, V .25, Si .25	Oil Mach. 90 Movement B
General Purpose Carbon Tool Steel (Not subject to test)	CORINTH Water Hardening	Straight Carbon	Water Mach. 100 Movement —C
General Purpose Carbon Tool Steel	POMPTON (Listed Above)		
High Stress, High Wear Machine Parts & Hot Forming (Short Run)	FCC CMS Cast-to-Shape Oil Hardening	C .60, Mn .70, Cr 1.00, Mo .40, V .10, Si .40, Ni .45	Oil Mach. 85 Movement B
Hot Work Dies (Forming, Piercing)	FCC TMS Cast-to-Shape Oil Hardening	C .50, Mn .55, Cr 1.55, V .10, Si .50, Ni 2.75	Oil Mach. 50 Movement A
Hot Work Dies (Hot Forming)	ATLAS A Oil, Air Hardening	C .30, Mn .30, Cr 3.00, W 9.00, V .50, Si .25	Oil, Air Mach. 70 Movement +B
Hot Work Dies (Hot Forming)	ATLAS B Oil, Air Hardening	C .40, Mn .30, Cr 3.00, W 11.50, V .50, Si .25	Oil, Air Mach. 70 Movement +B
Hot Work Dies (Hot Forming)	FCC 5X1 Cast-to-Shape Oil, Air Hardening	C .32, Mn .35, Cr 5.00, W 1.35, Mo 1.35, V .25, Si 1.05	Oil or Air Mach. 70 Movement B
Hot Work Dies (Hot Forming)	FCC 16B Cast-to-Shape Oil, Air Hardening	C .65, Mn .55, Cr .90, Mo .80, V .10, Si .30, Ni 1.80	Oil, Air Mach. 85 Movement A
Hot Work Dies (Hot Forming Gen'l Purpose Hot Work)	POTOMAC Oil, Air Hardening	C .32, Mn .30, Cr 5.00, W 1.25, Mo 1.50, V .25, Si .90	Oil, Air Mach. 70 Movement A
Hot Work Dies (Hot Forming Extrusion Liners)	FCC 5X1 Forgings	C .32, Mn .35, Cr 5.00, W 1.35, Mo 1.35, V .25, Si 1.05	Oil, Air Mach. 10 Movement —A
Hot Work Dies (Hot Forming Extrusion Liners)	FCC 14 Forgings Oil, Air Hardening	C .30, Mn .25, Cr 4.00, W 9.75, V .25, Si .20	Oil or Air Mach. 70 Movement A
Hot Work Dies (Hot Forming Extrusion Liners)	FCC #19	C .30-.40, Cr 4.00-5.50, Mn .25-.40, Si .80-1.75, W 3.75-4.25, V .20-.35	Oil
Hot Work Dies (Hot Punching)	SEMINOLE Medium Oil Hardening	C .42, Mn .30, Cr 1.30, W 2.00, V .25, Si .25	Oil Mach. 85 Movement +B
Hot Work Dies (Hot Punching, Shearing)	EB ALLOY Oil, Air Hardening	C .75, Mn .30, Cr 3.75, Mo .50, V .35, Si .25	Oil, Air Mach. 75 Movement +B
Hot Work Dies (Hot Punching, Shearing)	MOHAWK Oil, Air Hardening	C .45, Mn .30, Cr 3.50, W 14.00, V .70, Si .30	Oil, Air Mach. 60 Movement +A
Hot Work Dies	B-47	C .40, Cr 4.25, W 4.25, Co 4.25, V 2.25, Mo .40	Oil, Air Mach. 65 Movement A
Machinery Parts	FCC Chrome Vanadium Cast-to-Shape Oil Hardening	C .35, Mn .70, Cr 1.00, V .20, Si .30	Oil Mach. 90 Movement A
Plastic Mold Die Hubs	LUDLUM 609	C .60, Mn .80, Cr .25, Mo .25, V .20, Si 2.00	Oil, Water Mach. 80 Movement —C
Plastic Mold Die Hubs	SEMINOLE HARD Oil Hardening	C .52, Mn .30, Cr 1.30, W 2.00, V .25, Si .90	Oil Mach. 85 Movement +B
Plastic Mold Die Hubs	ONTARIO, SAGAMORE (Listed Above)		
Shock Resisting (General Purpose)	SEMINOLE HARD (Listed Above) Oil Hardening		
Shock Resisting (Intermittent Impact)	ATLAS 93 Oil Hardening	C .55, Mn .55, Cr .70, Mo .40, Si .20	Oil Mach. 90 Movement +B
Shock Resisting (Intermittent Impact) (Punching and Shearing)	LUDLUM 609 (Listed Above) Water, Oil Hardening		
Shock Resisting (Intermittent Impact)	PYTHON (Listed Above)		
Shock Resisting (Repeated Impacts)	LUDLUM 602 (Listed Above)		

ANCHOR DRAWN STEEL CO., See Vanadium-Alloys Steel Co., (Listing No. 48)

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. * % Machinability Annealed Movement in Hardening.
AMALGAMATED STEEL CORP., Broadway and Wire Ave., Cleveland 5, O.			**Listing No. 3**
Dies, Tools	DYKROME Air Hardening	C 1.50, Cr 11.50, Mo .75, V .25	Air
Dies, Tools	DYMAL Oil Hardening	C .90, Mn 1.15, Cr .50, W .50	Oil
Gages	DYMAL Oil Hardening	(Listed Above)	
General Use—Tool Room	T.R.S. Water, Oil Hardening	Special Analysis	Water, Oil
Hot Work Dies	KROTUNG Air Hardening	C .33, Cr 4.75, W 1.30, Mo 1.50, V .25, Si .90	Air
Punches, Dies, Slitters	KROPUNCH Air Hardening	Special Analysis	Air
ATLANTIC STEEL CORP., 1775 Broadway, New York 19, N. Y.			**Listing No. 4**
Cold Work (Blanking)	ATLAN Oil Hardening	C .90, Mn 1.15, Cr .50, W .50	Oil
Cold Work (Blanking)	ATLANTIC DIE Oil Hardening	C .70, Mn .40, Cr 1.00, Si .20, Ni 1.65	Oil
Cold Work (Blanking)	ATLAN HCC Oil and Air Hardening	C 1.50, Cr 12.00, Mo .80, V 1.00	Air or oil
Cold Work	ATLOY Z	C .40, Mn .85, Si .35, Cr 1.00, Ni 1.00, Mo .45	Oil
Punching and Shearing	TUNCRO Oil Hardening	C .50, Mn .25, Cr 1.40, W 2.00, V .25, Si .25	Oil
Punching and Shearing	(See ATLANTIC DIE, ATLAN HCC, Listed Above)		
Shock Resisting	ATLANTIC 33	C .33, Mn .40, Cr .75, Mo .75, Cu .75, Si .65	Water
ATLAS STEELS LTD., East Main St., Welland, Ont., Canada			**Listing No. 5**
Cold Work Dies (Blanking, Cold Forming)	ATLAS REFINED 10 Water Hardening	C 1.00, Mn .25, Si .20	Water Mach. 100 Movement —C
Cold Work Dies (Blanking, Cold Forming)	ATLAS X10 Water Hardening	C 1.05, Mn .20, Si .20	Water Mach. 100 Movement —C
Cold Work Dies (Blanking)	BADGER Oil Hardening	C 1.25, Mn .25, Cr .50, W 1.50, V .20, Si .25	Oil Mach. 85 Movement + A
Cold Work Dies (Blanking, Cold Forming)	CRO-MO-LOY Air Hardening	C 1.00, Mn 1.00, Cr 5.00, Mo 1.00, V .25, Si .30	Air Mach. 85 Movement + A
Cold Work Dies (Blanking, Cold Forming)	FNS Air Hardening	C 1.50, Mn .30, Cr 12.00, Mo .80, V .25, Si .30	Air Mach. 45 Movement + A
Cold Work Dies (Blanking, Cold Forming)	KEEWATIN Oil Hardening	C .90, Mn 1.20, Cr .50, W .50, Si .30	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Cold Forming)	NN Oil Hardening	C 2.25, Mn .30, Cr 12.50, V .25, Si .25	Oil Mach. 40 Movement + A
Cold Work Dies (Cold Forming)	ATLAS SPEC. ALLOY 10 Water Hardening	C 1.05, Mn .20, V .20, Si .20	Water Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	ATLAS XXX Water Hardening	C 1.35, Mn .30, Cr .35, W 3.75, Si .30	Water Mach. 75 Movement —C
Cold Work Dies (Cold Forming)	ATLAS XX95 Water Hardening	C .95, Mn .30, Si .30	Water Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	ATLAS X12 Water Hardening	C 1.20, Mn .25, Si .20	Water Mach. 100 Movement —C
Cutting Tools (Finishing)	ATLAS "Q" Water Hardening	C 1.20, Mn .25, Cr .50, Si .20	Water Mach. 95 Movement —C
Cutting Tools (Finishing)	DENINE Water Hardening	C 1.25, Mn .25, W 1.40, Si .25	Water Mach. 90 Movement —C
Cutting Tools (Finishing)	TROJAN High Speed	C. 80, Mn .25, Cr 4.00, W 18.50, Mo .50, V 2.00, Si .30	Oil, Air Mach. 45 Movement + A
Cutting Tools (Finishing)	(See ATLAS X12, BADGER, XXX, Listed Above)		
Cutting Tools (Roughing)	MOHICAN High Speed	C .80, Mn .25, Cr 4.00, W 1.50, Mo 9.00, V 1.20, Si .30	Oil, Air Mach. 55 Movement + A
Cutting Tools (Roughing)	NIPIGON High Speed	C .78, Mn .25, Cr 4.00, W 19.00, Mo .80, V 2.00, Co 8.00, Si .30	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing)	POWHATAN High Speed	C .75, Mn .25, Cr 4.00, W 19.00, V 1.25, Co 5.00, Si .30	Oil, Air Mach. 45 Movement + A
Cutting Tools (Roughing)	SIXIX High Speed	C .82, Mn .25, Cr 4.00, W 6.50, Mo 5.00, V 2.00, Si .30	Oil, Air Mach. 55 Movement + A
Cutting Tools (Roughing)	SPARTAN 7 High Speed	C .72, Mn .25, Cr 4.00, W 18.00, V 1.20, Si .30	Oil, Air Mach. 50 Movement + A
Die Casting Dies	ATLAS DIE Casting Steel Oil Hardening	C .40, Mn .75, Cr .60, Mo .15, Si .20, Ni 1.25	Oil Mach. 100 Movement B
Die Casting Dies	CRODI Air Hardening	C .35, Mn .40, Cr 5.00, Mo 1.40 V .40, Si 1.00	Air Mach. 75 Movement A
Die Casting Dies	HODI Air Hardening	C .28, Mn .30, Cr 3.25, W 9.50, V .40, Si .30	Oil, Air Mach. 70 Movement + A
Die Casting Dies	RED INDIAN Air Hardening	C .35, Mn .30, Cr 5.00, W. 4.50 Mo .30, V .30, Co .50, Si 1.00	Air Mach. 75 Movement A
Die Casting Dies	SENECA Oil, Air Hardening	C .35, Mn .30, Cr 3.25, W 9.50 V .40, Si .30	Oil, Air Mach. 70 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	SPARTAN 5 Oil, Air Hardening	C .50, Mn .30, Cr 4.00, W 18.00, V 1.00, Si .30	Oil, Air Mach. 55 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	ULTIMO 6 Oil, Air Hardening	C .55, Mn .55, Cr .75, Mo .75, Si .25, Ni 1.60	Oil Mach. 75 Movement A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See CRODI, RED INDIAN, SENECA, Listed Above)		
Plastic Molding Dies (Ejector Pins)	FALCON 6 Oil Hardening	C .55, Mn .25, Cr 1.50, W 2.00, V .25, Si .30	Oil Mach. 80 Movement + B

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Plastic Molding Dies (Ejector Pins)	MONARK 2 Water Hardening	C .60, Mn .75, Cr .30, Mo .20, Si 2.00	Oil Mach. 80 Movement —B
Plastic Molding Dies (Ejector Pins)	ATLAS X12 (Listed Above) Water Hardening		
Plastic Molding Dies (Hubs)	(See CRO-MO-LOY, FALCON 6, FNS, KEEWATIN, MONARK 2, NN)		
Plastic Molding Dies (Hubbed Cavity Dies)	ATLAS HOBBING IRON Water Hardening	C .05, Mn .20, Si .15	Water Movement —B
Plastic Molding Dies (Hubbed Cavity Dies)	IMPACTO Water Hardening	C .16, Mn .50, Mo .25, Si .20, Ni 1.75	Oil Movement —B
Plastic Molding Dies (Machine Cut Cavities)	SUPRIMPACTO Oil Hardening	C .12, Mn .50, Cr 1.50, Si .20, Ni 3.75	Oil Mach. 100 Movement —B
Plastic Molding Dies (Mach. Cut Cavities)	(See CRO-MO-LOY, KEEWATIN Listed Above)		
Punching and Shearing	ATLAS REFINED 8 Water Hardening	C .80, Mn .25, Si .20	Water Mach. 100 Movement —C
Punching and Shearing	FALCON 4 Oil Hardening	C .45, Mn .25, Cr 1.50, W 2.00, V .25, Si .30	Oil Mach. 80 Movement +B
Punching and Shearing	(See ATLAS XXX, ATLAS X10, FALCON 6, FNS, MONARK 2, NN, ULTIMO 6)		
Shock Resisting (Intermittent Impact)	ATLAS ALPHA 8 Water Hardening	C .80, Mn .25, Si .20, Cr-W-Mo-V higher than normal residuals	Water Mach. 100 Movement —C
Shock Resisting (Intermittent Impact)	MAPLE LEAF Water Hardening	C .80, Mn .30, Si .25, Cr-W-Mo-V higher than normal residuals	Water Mach. 100 Movement —C
Shock Resisting (Repeated Impact)	ATLAS SPECIAL ALLOY 8 Water Hardening	C .80, Mn .20, V .20, Si .20	Water Mach. 100 Movement —C
Shock Resisting (Repeated Impact)	(See ATLAS REFINED 8, FALCON 4, FALCON 6, MONARK 2)		

BETHLEHEM STEEL CO., 701 E. Third St., Bethlehem, Pa. — Listing No. 6

Blacksmithing Tools	SOLID DRILL Water, Oil Hardening	C .75, Mn .20, Si .15	Water, Oil Movement ±B
Cold Work Dies (Blanking, Cold Forming)	A-H5 Air Hardening	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25	Air Mach. 70 Movement +A
Cold Work Dies (Blanking, Cold Forming)	BTR Oil Hardening	C .90, Mn 1.20, Cr .50, W .50, V .20	Oil Mach. 90 Movement +B
Cold Work Dies (Blanking, Cold Forming)	BEST Water Hardening	C .75-1.10, V .15-.25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	LEHIGH H Air Hardening	C 1.55, Cr 11.50, Mo .80, V .40	Air Mach. 45 Movement +A
Cold Work Dies (Blanking, Cold Forming)	LEHIGH L Air Hardening	C .85, Cr 11.50, Mo .45, V .30, Ni 1.00	Oil, Air Mach. 50 Movement ±A
Cold Work Dies (Blanking, Cold Forming)	LEHIGH S Oil Hardening	C 2.05, Cr 11.50, V .60	Oil Mach. 45 Movement +B
Cold Work Dies (Blanking, Cold Forming)	SUPERIOR Water Hardening	C .80-1.35, V .15-.25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	X Water Hardening	C .75-1.10	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	XX Water Hardening	C .90-1.30	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	XXX Water Hardening	C .90-1.35	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	XCL Water Hardening	C .80-1.20	Water Mach. 100 Movement +C
Cutting Tools (Finishing)	HM High Speed	C .78, Cr 3.90, W 1.60, Mo 8.50, V 1.05	Oil, Air Mach. 65 Movement ±A
Cutting Tools (Roughing)	COMOKUT High Speed	C .74, Cr 4.50, W 18.25, Mo .75, V 1.25, Co 5.00	Oil, Air Mach. 55 Movement ±A
Cutting Tools (Roughing, Finishing)	SPECIAL HS High Speed	C .73, Cr 4.00, W 18.00, V 1.10	Oil, Air Mach. 60 Movement ±A
Cutting Tools (Roughing, Finishing)	66HS High Speed	C .83, Cr 4.15, W 6.35, Mo 5.00, V 1.90	Oil, Air Mach. 65 Movement ±A
Cutting Tools (Rough Drilling)	HOLLOW DRILL Water, Oil Hardening	C .75, Mn .20, Si .15	Water, Oil Movement ±B
Cutting Tools (Stone Drilling)	BROACHING & CHANNELLER Water Hardening	C .80, Mn .35, Si .25	Water Movement +C
Die Casting Dies	CR-MO-V Air Hardening	C .38, Cr 5.25, Mo 1.25, V 1.00, Si 1.05	Air Mach. 70 Movement +A
Die Casting Dies	CR-MO-W Air Hardening	C .35, Cr 5.15, W 1.55, Mo 1.65, Si 1.05	Air Mach. 70 Movement +A
Die Casting Dies	MULTIMOLD Oil Hardening	C .35, Mn .70, Cr .80, Mo .30, Si .45	Oil Mach. 80 Movement +B
Die Casting Dies	57 HW Air Hardening	C .33, Cr 3.25, W 9.35, V .30	Air Mach. 65 Movement +A
Die Casting Dies	57 HW SPECIAL Air Hardening	C .42, Cr 3.50, W 14.00, V .30	Air Mach. 60 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	HW8 Air Hardening	C .60, Cr 3.60, Mo 8.50, V 1.75	Air Mach. 65 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See CR-MO-V, CR-MO-W, 57 HW, 57 HW SPECIAL ..... Listed Above)		
Plastic Molding Dies	DURAMOLD A Air Hardening	C .07, Mn .35, Cr 4.50, Mo .50, Si .20	Air Mach. 60 Movement +A
Plastic Molding Dies	DURAMOLD B Oil Hardening	C .06, Mn .30, Cr .95, Mo .25, Si .15 Boron Added	Oil Mach. 50 Movement +B
Plastic Molding Dies	DURAMOLD C Water Hardening	C .06, Mn .15, Si .10	Water Mach. 40 Movement +C
Plastic Molding Dies (Machined Cavity)	DURAMOLD N Oil Hardening	C .10, Mn .50, Cr 1.50, Si .25, Ni 3.50	Oil Mach. 80 Movement +B
Plastic Molding Dies (Machined Cavity)	(See BTR, A-H5, MULTIMOLD ..... Listed Above)		
Plastic Molded Dies (Hobs)	(See BTR, A-H5, LEHIGH H ..... Listed Above)		
Plastic Molding Master Hobs	67 CHISEL Oil Hardening	C .50, Cr 1.25, W 2.50, V .20, Si .75	Oil Mach. 75 Movement +B

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. * % Machinability Annealed Movement in Hardening.
Press Brake Dies	BRAKE DIE Oil Hardening	C .50, Mn 1.00, Cr .85, Mo .20	Oil Mach. 100 Movement +B
Punching & Shearing	OMEGA Water, Oil Hardening	C .60, Mn .70, Mo .45, V .20, Si 1.85	Oil, Water Mach. 65 Movement ±B
Punching & Shearing	71 ALLOY Water, Oil Hardening	C .65, Mn .90, Si 2.00	Oil, Water Mach. 65 Movement ±B
Punching & Shearing	(See X, XX, XXX, XCL, BEST, BTR, A-H5, LEHIGH H, LEHIGH L, LEHIGH S, 67 CHISEL, SUPERIOR	Listed Above)	
Punching & Shearing	TOUGH M Oil Hardening	C .45 Mn .55, Cr .95, V .20, Si .20	Oil Mach. 80 Movement +B
Shock Resisting Tools (Repeated, Intermittent Impact)	(See OMEGA, TOUGH M, 67 CHISEL, 71 ALLOY	Listed Above)	
Special Purpose (Cold Work Dies)	BETHALLOY Oil Hardening	C .75, Mn .75, Cr .90, Mo .35, Ni 1.80	Oil Mach. 85 Movement +B
Special Purpose (Cutting Tools)	67 TAP Oil Hardening	C 1.25, Cr .65, W 1.40, V .20	Oil Mach. 60 Movement +B
Special Purpose (Cutting Tools)	BFS Water Hardening	C 1.30, Mn .28, W 3.50	Water Mach. 70 Movement +C
Special Purpose (Shock Resisting)	NON-TEMPERING Water, Oil Hardening	C .35, Mn .70, Cr .80, Mo .30, Si .45 Cu .30	Water, Oil Mach. 80 Movement ±B
Special Purpose (Shock Resisting)	PISTON Water Hardening	C 1.15, Cr .55, V .20	Water Mach. 80 Movement +C

BISSETT STEEL CO., 945 E. 67th St., Cleveland 3, O. — Listing No. 7

Cold Work Dies (Blanking, Cold Forming)	BISCO TOOL STEEL TUBING Oil Hardening	C 1.00, Mn 1.00, Cr 1.50, Mo .20	Oil
Cold Work Dies	AIRPRO Air Hardening	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25 Si .20	Air
Cold Work Dies	OILTEMP Oil Hardening	C .90, Mn 1.10, Cr .50, W .50, V .20	Oil
Cutting Tools (Finishing)	CARBON Water Hardening	C As Desired, Mn .25, Si .20	Brine
Cutting Tools (Finishing)	CARVAN Water Hardening	C As Desired, Mn .25, V .25, Si .20	Brine
Cutting Tools (Finishing)	TIGER VAN High Speed	C .80, Cr 4.25, W 18.50, Mo .50, V 2.10	Oil
Cutting Tools	BISMO M-2 High Speed	C .82, Cr 4.00, W 6.50, Mo 5.00, V 1.90	Oil
Cutting Tools	BISMO M-3 High Speed	C 1.00, Cr 4.00, W 6.25, Mo 6.25, V 2.40	Oil
Cutting Tools	BISMO 8-4-1 High Speed	C As Desired, Cr 4.00, W 1.50, Mo 8.50, V 1.15	Oil
Cutting Tools	SUPER TIGER High Speed	C .80, Cr 4.50, W 18.50, Mo .80, V 1.75, Co 7.50	Oil
Cutting Tools	TIGER BRAND High Speed	C As Desired, Cr 4.00, W 18.00, V 1.10	Oil
Cutting Tools	TIGER SPECIAL High Speed	C .75, Cr 4.25, W 18.00, Mo .50, V 1.10, Co 5.00	Oil
Die Casting (Aluminum)	GRIPMORE NO. 1 Air Hardening	C .35, Mn .35, Cr 5.00, Mo 1.00, V .40, Si 1.00	Air
Die Casting (Aluminum)	GRIPMORE NO. 1-V Air Hardening	C .35, Mn .35, Cr 5.00, Mo 1.00, V 1.10, Si 1.00	Air
Hot Work Dies	CHECKNO NO. 1 Oil Hardening	C .45, Mn .25, Cr 3.50, W 13.25, Si .20	Oil
Hot Work Dies	CHECKNO NO. 2 Oil Hardening	C .35, Mn .25, Cr 3.50, W 11.00, V .45, Si .20	Oil
Hot Work Dies	CHECKNO NO. 3 Oil Hardening	C .28, Mn .30, Cr 3.25, W 8.50, V .30 Si .30	Oil
Hot Work Dies	CROMVA Water, Oil Hardening	C .35 or .50, Mn .60, Cr 1.00, V .20	Water, Oil
Hot Work Dies	HYPRO A Oil, Air Hardening	C .35, Mn .60, Cr 7.50, W 7.50, Si 1.50	Oil, Air
Hot Work Dies	HYPRO B Air Hardening	C .35, Mn .25, Cr 5.25, W 5.25, Mo .20, V .20, Co .50, Si .90	Air
Hot Work Dies	WOCO Oil, Air Hardening	C .45, Cr 1.50, W 2.25, V .25	Oil
Hot Work Dies	GRIPMORE NO. 2 Air Hardening	C .35, Mn .35, Cr 5.00, W 1.35, Mo 1.75, Si 1.00	Air
Punching, Shearing	ANNITE NO. 1 Oil Hardening	C 2.25, Mn .30, Cr 13.00, V .20, Si .25	Oil
Punching, Shearing	ANNITE NO. 2 Air Hardening	C 1.50, Mn .30, Cr 11.50, Mo .80, V .25, Si .25	Air
Shock Resisting	CROMO Oil Hardening	C .55, Mn .50, Cr 1.00, Mo .35	Oil
Shock Resisting	SILIMO Water, Oil Hardening	C .50, Mn .45, Mo .50, V .20, Si 1.10	Water, Oil
Shock Resisting	SILICARB Water, Oil Hardening	C .55, Mn .75, Mo .20, Si 2.00	Water, Oil
Shock Resisting	(See CROMVA, WOCO, Listed Above)		

H. BOKER & CO. INC., 101 Duane St., New York 7, N. Y. — Listing No. 8

Blanking and Forming Dies	KINITE (Air Hardening) In Rolled, Bars and Casting form	C 1.52, Mn .54, Cr 13.74, Mo. .98, V .60, Co .57, Si .47, Ni .16	Air (High Speed) Movement A
Cutting Tools	NOVO SUPERIOR High Speed	C .72, Mn .24, Cr 4.14, W 18.36, V 1.08, Si .27	Oil (High Speed) Movement A
Cutting Tools	TWIN MO High Speed	C .84, Si .25, Mn .25, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil Mach. (High Speed)
Dies	OILWAY Oil Hardening	C .94, Mn 1.23, Cr .44, W .57	Oil See (*) Movement A

* Same as carbon water hardening steel.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

BOYD-WAGNER CO., 1440 W. Lake St., Chicago 7, Ill. — Listing No. 9

Cold Work Dies (Cold Forming)	No. 4 COLD HEADER Water Hardening	C 1.00, Mn .30, Si .20	Water Movement B
Cutting Tools	RECORD EMINENT Oil Hardening, High Speed	C .75, Mn .30, Cr 5.00, W 18.50, V 1.50, Co 8.50, Si .20	Oil, Air Movement A
Cutting Tools	RECORD SUPERIOR Oil Hardening, High Speed	C .70, Mn .30, Cr 4.00, W 18.00, V 1.00, Co .30, Si .20	Oil, Air Movement A
Cutting Tools	RECORD 66 Oil Hardening, High Speed	C .80, Mn .30, Cr 4.50, W 5.50, Mo 4.50, V 1.50, Si .20	Oil Movement A
Cutting Tools (Roughing)	RECORD STAR Oil Hardening, High Speed	C .70, Mn .35, Cr 4.00, W 14.00, V 2.00, Si .20	Oil, Air Movement A
Dies and Tools	ARROW OIL HARDENING Oil Hardening	C .95, Mn 1.20, Cr .50, W .50, V .10, Si .20	Oil Movement A
Dies and Tools	BEST W. H. Water Hardening	C .95, Mn .30, Si .20	Water Movement B
Dies and Tools	BOWCO NON-SHRINK Oil Hardening	C .90, Mn 1.20, Cr .50, W .50, Si .35	Oil Movement A
Dies and Tools	BOWCO 7720 Oil Hardening	C 1.20, Mn .55, Cr 1.65, Mo .45, Si .30	Oil Movement B
Dies and Tools	FORMALOY Oil Hardening	C .75, Mn .30, Cr 1.00, Mo .20, Si .25, Ni 1.75	Oil Movement B
Dies and Tools	HYPRO 61 HCHC Air Hardening, High Speed	C 1.50, Mn .25, Cr 11.50, Mo .80, V .85, Co .40, Si .40	Air Movement A
Dies and Tools	HYPRO 62 HCHC Oil Hardening, High Speed	C 2.00, Mn .60, Cr 12.00, Si .40	Oil Movement A
Dies and Tools	HYPRO 63 HCHC Air Hardening, High Speed	C 1.70, Mn .20, Cr 18.00	Oil, Air Movement A
Fast Finish	CROWN W Water Hardening	C 1.30, Mn .30, Cr 1.80, W 4.00, V .20, Si .20	Water Movement A
Hot Work Dies (Forming)	EZ14W High Speed	C .45, Mn .30, Cr 3.00, W 14.00, V .30, Si .20	Oil, Air Movement A
Hot Work Dies (Punching, Shearing)	EZ9W High Speed	C .40, Mn .30, Cr 3.00, W 9.00, V .20, Si .20	Oil, Air Movement A
Jewelers Dies	VERY BEST W. H. Water Hardening	C 1.05, Mn .30, Cr .50, V .10, Si .20	Water Movement B
Punching and Shearing	DUREDGE Water, Oil Hardening	C .55, Mn .75, Mo .35, Si 2.00	Water Movement A
Shock Resisting	SPECIAL 18 Oil, Air Hardening	C .45, Mn .30, Cr 1.40, W 2.20, Mo .30, V .20, Si 1.00	Water, Air, Oil Movement A
Tools	STANDARD Water Hardening	C 1.10, Mn .30, Si .20	Water Movement B

BRAEBURN ALLOY STEEL DIVISION, Continental Copper & Steel Industries Inc., Braeburn, Pa. — Listing No. 10

Cold work Dies (Blanking, Cold Forming)	AIRQUE Air Hardening	C 1.00, Mn .70, Cr 5.25, Mo 1.15, V .25, Si .30	Air Movement A
Cold work Dies (Blanking, Cold Forming)	EXTRA Water Hardening	C 1.00, Mn .25, Si .25	Water Movement C
Cold work Dies (Blanking, Cold Forming)	KISKI Oil Hardening	C .95, Mn 1.10, Cr .50, W .60, V .20, Si .30	Oil Movement A
Cold work Dies (Blanking, Cold Forming)	SPECIAL Water Hardening	C 1.00, Mn .25, V .20, Si .25	Water Movement C
Cold work Dies (Blanking, Cold Forming)	SUPERIOR 1 Oil Hardening	C 2.15, Mn .50, Cr 12.50, V .60, Si .30	Oil Movement A
Cold work Dies (Blanking, Cold Forming)	SUPERIOR 3 Oil, Air Hardening	C 1.50, Mn .30, Cr 12.00, Mo .80, V .80, Si .30	Oil Movement A
Cutting Tools (Roughing)	BONDED CARBIDE High Speed	C .70, Mn .25, Cr 4.50, W 18.50, Mo. 70, V 1.50, Co 12.00, Si .25	Oil Movement B
Cutting Tools (Roughing)	BONDED CARBIDE Jr. High Speed	C .77, Mn .25, Cr 4.25, W 18.50, Mo .75, V 1.95, Co 7.60, Si .25	Oil Movement B
Cutting Tools (Roughing)	COBALT High Speed	C .74, Mn .25, Cr 4.00, W 18.00, Mo .50, V 1.00, Co 5.00, Si .25	Oil Movement B
Cutting Tools (Roughing)	COMO High Speed	C .77, Mn .25, Cr 4.00, W 1.55, Mo 8.50, V 1.20, Co 5.00, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	BRAEMOW High Speed	C .82, Mn .25, Cr 4.20, W 6.50, Mo 5.00, V 1.90, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	BRAEVAN M-3 High Speed	C 1.00, Mn 25, Cr 4.00, W 6.20, Mo 5.60, V 2.50, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	CONGO High Speed	C .78, Mn .25, Cr 4.00, W 4.00, Mo 5.00, V 1.40, Co 12.00, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	MOCUT High Speed	C .80, Mn .25, Cr 4.00, W 1.55, Mo 8.00, V 1.10, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	TWINVAN High Speed	C .82, Mn .25, Cr 4.25, W 18.50, Mo .65, V 2.10, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	VINCO High Speed	C .70, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .25	Oil Movement B
Die Casting Dies (Aluminum)	PRESSURDIE 3 Air Hardening	C .39, Mn .30, Cr 5.50, Mo 1.10, V 1.00, Si 1.00	Air Movement A
Hot Work Dies (Punching, Forming)	PRESSURDIE 1 Air Hardening	C .38, Mn .30, Cr 5.00, W 5.00, Mo .25, V .20, Co .50, Si .90	Air Movement A
Hot Work Dies (Punching, Forming)	T-ALLOY Oil, Air Hardening	C .35, Mn .25, Cr 3.50, W 10.50, V .40, Si .25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "A" Oil, Air Hardening	C .33, Mn .25, Cr 3.50, W 9.60, V .50, Si .25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "B" Oil, Air Hardening	C .50, Mn .25, Cr 3.00, W 15.00, V .50, Si .25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "C" Oil, Air Hardening	C .25, Mn .25, Cr 4.00, W 15.00, V .50, Si .25	Oil Movement B

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Machined Plastic Molding, Extrusion Dies..	PRESSURDIE 2 Air Hardening	C .35, Mn .35, Cr 5.00, W 1.20, Mo 1.45, V .35, Si 1.00	Air Movement A
Shock Resisting	TRITON Water Hardening	C .50, Mn .35, Mo .60, Si 1.00	Water Movement B
Shock Resisting	VIBRO Oil Hardening	C .50, Mn .25, Cr 1.40, W 1.90, V .25, Si .25	Oil Movement B

CARBOLOY DEPARTMENT, General Electric Co., 11147 E. Eight Mile Rd., Detroit 32, Mich. — Listing No. 11

Cutting Tools (Finishing, Cast Iron, Non-Ferrous) .....905 Carbide
Cutting Tools (Finishing & Light Roughing, Steel) ..... 78 Carbide
Cutting Tools (Precision Finishing, Cast Iron, Non-Ferrous) ..999 Carbide
Cutting Tools (Precision Finishing, Steel) .....831 Carbide
Cutting Tools (Roughing Cuts, Cast Iron, Non-Ferrous) .....44A Carbide
Cutting Tools (General Purpose, Cast Iron, Non-Ferrous) ....883 Carbide
Cutting Tools (General Purpose Machining, Steel) .....78B Carbide
Cutting Tools (Cutting Hot Welding Flash) .....77B Carbide
Cutting Tools (Heavy Duty Machining, Steel) .....78C Carbide
Cutting Tools (Heavy Duty Metal Cutting, Shock Resistant)..55A Carbide
Cutting Tools (Machining Alloy Cast Irons & Aluminum) ...907 Carbide
Cutting Tools (Woodworking—Large Tips, Intricate Forms)..44A Carbide
Cutting Tools (Woodworking—Small Tips, Simple Form Tools).883 Carbide
Mining Tools (Rotary & Percussion Type) .....55A Carbide
Dies (Fine Wire Drawing) .....44A Carbide
Dies (Fine Wire Drawing, Small Sizes Steel Wire) .....999 Carbide
Dies (Wire Drawing) .....779 Carbide
Dies (Deep Drawing) .....55A Carbide
Dies (Blanking & Light Heading) .....55B Carbide
Dies (Heavy Duty Heading, Toughest Die Material Available).190 Carbide
Mechanical Applications (Extreme Wear Resistance) .....883 Carbide
Mechanical Applications (Wear & Light Shock Resistance) ..44A Carbide
Mechanical Applications (High Strength,Wear & Shock Resistance) ..... 55A Carbide
Mechanical Applications (Wear, With Corrosion & Heat Resistance) .....608 Chrome Carbide
Mechanical Applications (Heavy, Non-Cutting Metal For Rotors, Balance Weights) .....Hevimet
Mechanical Applications (Radio-Active Shielding) .....Hevimet

CARPENTER STEEL CO., 339 W. Bern St., Reading, Pa. — Listing No. 12

Cold Work Dies (Blanking)	SPEED STAR High Speed, Hot Work Tool Steel	C .82, Mn .25, Cr 4.25, W 6.25, Mo 5.00, V 1.90, Si .25	Oil Mach. 45 Movement + A
Cold Work Dies (Blanking)	STAR-ZENITH High Speed, Hot Work Tool Steel	C .72, Mn .25, Cr 4.00, W 18.25, V 1.15, Si .20	Oil Mach. 45 Movement + A
Cold Work Dies (Cold Forming)	H-9 EXTRA Water Hardening	C .90, Mn .40, Si .40	Water Mach. 100 Movement ±C*
Cold Work Dies (Cold Forming)	SOLAR Water Hardening	C .50, Mn .40, Mo .50, Si 1.00	Water Mach. 75 Movement ±C*
Cold Work Dies (Blanking, Cold Forming)	HAMPDEN Oil Hardening	C 2.10, Mn .25, Cr 12.50, Si .25 Ni .50	Oil Mach. 50 Movement + A
Cold Work Dies (Blanking, Cold Forming)	K-W Water Hardening	C 1.30, Mn .30, W 3.50, Si .30	Water Mach. 80 Movement —C
Cold Work Dies (Blanking, Cold Forming)	No. 11 SPECIAL Water Hardening	C 1.05, Mn .20, Si .20	Water Mach. 100 Movement ±C*
Cold Work Dies (Blanking, Cold Forming)	NO. 484 Air Hardening	C 1.00, Mn .70, Cr 5.00, Mo 1.00, V .20, Si .20	Air Mach. 70 Movement + A
Cold Work Dies (Blanking, Cold Forming)	NO. 610 Air Hardening	C 1.50, Mn .30, Cr 12.00, Mo .80, V .90, Si .30	Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Cold Forming)	R. D. S. Oil Hardening	C .75, Mn .35, Cr 1.00, Si .25, Ni 1.75	Oil Mach. 75 Movement + A
Cold Work Dies (Blanking, Cold Forming)	STENTOR Oil Hardening	C .90, Mn 1.60, Si .25	Oil Mach. 100 Movement + A
Cold Work Dies (Blanking, Cold Forming)	VEGA Air Hardening	C .70, Mn 2.00, Cr 1.00, Mo 1.35, Si .30	Air Mach. 80 Movement + A
Cutting Tools (Finishing)	K-W	(Listed Above)	
Cutting Tools (Roughing, Finishing)	STAR COLUMBIUM High Speed	C .80, Cr 4.25, W 5.50, Mo 4.50, V 1.50, Cb 1.25	Oil Mach. 45 Movement + A
Cutting Tools (Roughing, Finishing)	(See SPEED STAR, STAR-ZENITH, Listed Above)		
Die Casting Dies (Hubbed Cavity Dies)	SUPER SAMSON	C .10, Mn .30, Cr 5.00, Mo .90, V .25, Si .20	Oil, Air Mach. 70 Movement ±A
Die Casting Dies	NO. 883 Hot Work Tool Steel	C .40, Mn .35, Cr 5.00, Mo 1.35, V .90, Si 1.10	Oil, Air Mach. 65 Movement ±B*
Die Casting Dies (Ejector Pins)	NO. 883	(Listed Above)	
Gages	CASE-HARDENING Thread Gage Steel... Oil Hardening	C .20, Mn 1.30, Si .20	Oil Mach. 100 Movement + A
Gages	(See HAMPDEN, No. 11 SPECIAL, No. 484, No. 610, STENTOR, Listed Above)		
High-Stress, High Wear Machinery Parts..	(See CASE HARDENING THREAD GAGE STEEL, R.D.S., Listed Above)		
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	T-K Hot Work Tool Steel	C .35, Mn .30, Cr 3.50, W 9.00, V .40, Si .30	Oil, Air Mach. 55 Movement ±B*
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	NO. 883	(Listed Above)	
Hot Work Dies (Hot Punching, Hot Shearing)	(See SPEED STAR, STAR-ZENITH, Listed Above)		
Plastic Molding Dies (Ejector Pins)	(See No. 11 SPECIAL, SOLAR, STENTOR, Listed Above)		
Plastic Molding Dies (Hubs)	VEGA	(Listed Above)	
Plastic Molding Dies (Hubbed Cavity Dies)	MIRROMOLD Water Hardening	C .10, Mn .20, V .10	Water Movement ±B*
Plastic Molding Dies (Machine Cut Cavity Dies)	NO. 158 Oil Hardening	C .10, Mn .40, Cr 1.50, Ni 3.50	Oil, Air Movement + B, + A
Plastic Molding Dies (Machine Cut Cavity Dies)	STENTOR	(Listed Above)	
Plastic Molding Dies (Machine Cut and Hubbed Cavity Dies)	SAMSON EXTRA Water, Oil Hardening	C .10, Mn .30, Cr 2.30, Si .20	Water, Oil Movement ±B, ±A
Plastic Molding Dies (Machine Cut and Hubbed Cavity Dies)	SUPER SAMSON	(Listed Above)	
Plastic Molding Dies (Hubs Cavity Dies, Machine Cut Cavity Dies)	STAINLESS M. S. No. 2 Oil, Air Hardening	C .30, Cr 13.00	Oil, Air Movement ±B, ±A*
Plastic Molding Dies (Machine Cut Cavity Dies, Hubs)	R. D. S. Oil Hardening	(Listed Above)	

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Plastic Molding Dies (Machine Cut Cavity Dies, Hubs, Ejector Pins)	VEGA (Listed Above)		
Punching and Shearing	(See HAMPDEN, H-9 EXTRA, No. 11 SPECIAL, No. 484, No. 610, R.D.S., SOLAR, STENTOR, VEGA, Listed Above)		
Shock Resisting (Repeated, Intermittent Impact)	(See R.D.S., SOLAR, VEGA, Listed Above) † To=temperature reached in service.		★ Plus or minus—depending on size and shape of section.

CESCO ELECTRIC STEEL CORP., 123 E. Seventh Ave., Homestead, Pa. — Listing No. 13

Shock Resisting	CESCO SPECIAL Water, Oil, Air Hardening	C .55, Mn 1.00, Mo .40, V .35, Si 2.00		Water, Oil, Air Mach. 50 Movement C
Shock Resisting	SUPER CESCO Water, Oil, Air Hardening	C .55, Mn 1.00, Mo 1.30, V .35, Si 2.00		Water, Oil, Air Mach. 50 Movement C

COLONIAL STEEL CO., See Vanadium-Alloys Steel Co. (Listing No. 48)

COLUMBIA TOOL STEEL CO., Chicago Heights, Ill. — Listing No. 14

Cold Work Dies (Blanking, Cold Forming)	ATMODIE Air Hardening High Carbon, High Chrome	C 1.50, Mn .30, Cr 12.00, Mo .85, V .85, Si .40		Air Movement A
Cold Work Dies (Blanking, Cold Forming)	CLARITE T_1 High Speed	C .73, Mn .30, Cr 4.00, W 18.00, V 1.10, Si .30		Oil Movement C
Cold Work Dies (Blanking, Cold Forming)	EXLDIE Oil Hardening, Non-Deforming	C .90, Mn 1.15, Cr .50, W .50, V .10, Si .25		Oil Movement B
Cold Work Dies (Blanking, Cold Forming)	EXTRA Water Hardening	C 1.00, Mn .25, Si .25		Water Movement C
Cold Work Dies (Blanking, Cold Forming)	EZ-DIE Air Hardening, Non-Deforming	C 1.00, Mn .60, Cr 5.25, Mo 1.15, V .25, Si .30		Air Movement B
Cold Work Dies (Blanking, Cold Forming)	MOLITE M_2 High Speed	C .83, Mn .25, Cr 4.15, W 6.40, Mo 5.00, V 1.90, Si .30		Oil Movement C
Cold Work Dies (Blanking, Cold Forming)	OILDIE Oil Hardening, Non-Deforming	C 1.05, Mn .70, Cr 1.60, W .50, Si .40		Oil Movement B
Cold Work Dies (Blanking, Cold Forming)	SPECIAL Water Hardening	C 1.00, Mn .25, Cr .16, V .05, Si .25		Water Movement C
Cold Work Dies (Blanking, Cold Forming)	STANDARD Water Hardening	C 1.00, Mn .25, Si .25		Water Movement C
Cold Work Dies (Blanking, Cold Forming)	SUPERDIE High Carbon, High Chrome	C 2.10, Mn .30, Cr 11.50, W .80, Si .90		Oil Movement A
Cold Work Dies (Blanking, Cold Forming, not severe)	VANADIUM STANDARD Water Hardening	C .90, Mn .25, V .20, Si .25		Water Movement C
Cold Work Dies (Blanking, Cold Forming)	WATERDIE EXTRA Water Hardening	C 1.00, Mn .35, Cr .50, Si .25		Water Movement C
Cutting Tools (Finishing)	VANITE High Speed	C .83, Mn .25, Cr 4.25, W 18.50, Mo 1.00 Max, V 2.15, Si .30		Oil Movement C
Cutting Tools (Roughing)	MAXITE Cobalt High Speed	C .73, Mn .25, Cr 4.00, W 14.00, Mo 1.00 Max, V 2.15, Si .30, Co 4.75		Oil Movement C
Cutting Tools (Finishing, Roughing)	(See CLARITE, MOLITE, Listed Above)			
Die Casting Dies	CASTDIE Air Hardening, Heat Resistant	C .38, Mn .35, Cr 5.25, Mo 1.35, V .50 Si 1.00		Movement A Air
Hot Work Dies (Hot Forming, Punch & Shear)	BUSTER Oil Hardening, Shock Resistant	C .58, Mn .30, Cr 1.25, W 2.25, V .25, Si .75		Oil Movement B
Hot Work Dies (Hot Forming, Punch & Shear)	C.E.C. IMPACT Water & Oil Hardening, Shock Resistant	C .55, Mn .80, Cr .30, V .25, Si 2.00		Water, Oil Movement B
Hot Work Dies (Hot Forming, Punch & Shear)	FIREDIE Air Hardening, Heat Resistant	C .38, Mn .35, Cr 5.25, Mo 1.35, V .50, Si 1.00		Air Movement A
Hot Work Dies (Hot Forming, Punch & Shear)	FORMITE High Speed, Heat Resistant	C .35, Mn .25, Cr 4.00, W 13.50, Mo .60 Max, V .35, Si .40		Oil, Air Movement B
Hot Work Dies (Hot Forming, Punch & Shear)	FORMITE #2 High Speed, Heat Resistant	C .30, Mn .30, Cr 3.25, W 9.25, Mo .60 Max, V .50, Si .40		Oil Movement B
Hot Work Dies (Hot Forming, Punch & Shear)	MOLITE—HW 10 High Speed, Heat Resistant	C .64, Mn .30, Cr 4.00, Mo 8.25, V 2.00, Si .30		Oil, Air Movement C
Plastic Mold Dies	(See ATMODIE, BUSTER, EXLDIE, OILDIE, SUPERDIE, Listed Above)			
Punching & Shearing	(See ATMODIE, SUPERDIE, OILDIE, EXLDIE, CLARITE, MOLITE, SPECIAL, EXTRA, Listed Above)			
Shock Resisting (Repeated Intermittent Impact)	EXTRA HEADER DIE Water Hardening	C .95, Mn .35, Si .25		Water Movement C
Shock Resisting (Repeated Intermittent Impact)	VANADIUM EXTRA Water Hardening	C .95, Mn .25, V .20, Si .25		Water Movement C
Shock Resisting (Repeated Intermittent Impact)	(See BUSTER, SPECIAL, EXTRA, Listed Above)			

CRUCIBLE STEEL CO. OF AMERICA, 405 Lexington Ave., New York 17, N. Y. — Listing No. 15

Cold Work Dies (Blanking)	AIRDI 150 Air Hardening	C 1.50, Cr 11.50, Mo .80, V .20		Air, Oil or Liquid Bath
Cold Work Dies (Blanking)	AIRKOOL Air Hardening	C 1.00, Mn .40, Cr 5.25, Mo 1.15, V .40		Air, Oil or Liquid Bath
Cold Work Dies (Blanking)	CHAMPION NON-CHANGEABLE Oil Hardening	C .90, Mn 1.25, Cr .50, W .50		Oil
Cold Work Dies (Blanking)	HYCC Air Hardening	C 2.25, Cr 11.50, Mo .80, V .20		Air, Oil or Liquid Bath
Cold Work Dies (Blanking)	KETOS Oil Hardening	C .90, Mn 1.25, Cr .50, W .50		Oil

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Cold Forming)	ALVA EXTRA Water Hardening	C .95, V .20	Water, Brine
Cold Work Dies (Cold Forming)	ATHA PNEU Oil Hardening	C 0.50, Cr 1.25, W 2.75, V .20	Oil
Cold Work Dies (Cold Forming)	CRESCENT SPECIAL Water Hardening	C 1.05	Water, Brine
Cold Work Dies (Cold Forming)	LaBELLE EXTRA Water Hardening	C .95	Water, Brine
Cold Work Dies (Cold Forming)	LaBELLE SILICON #2 Water Hardening	C .60, Mn .75, Cr .25, Mo .30, Si 1.90	Water
Cold Work Dies (Cold Forming)	LaBELLE COLD STRIKING DIE Water Hardening	C .95	Water, Brine
Cold Work Dies (Cold Forming)	SANDERSON EXTRA Water Hardening	C 1.05	Water, Brine
Cold Work Dies (Cold Forming)	AIRKOOL Air Hardening	C 1.00, Mn .40, Cr 5.25, Mo 1.15, V .40	Air, Oil or Liquid Bath
Cutting Tools (Roughing)	REX AAA High Speed	C .75, Cr 4.00, W 18.00, Mo .75, V 1.15, Co 5.00	Air, Oil or Liquid Bath
Cutting Tools (Roughing)	REX M-25 High Speed	C .83, Cr 4.15, W 6.40, Mo 5.00, V 1.90, Co 5.00	Air, Oil or Liquid Bath
Cutting Tools (Roughing)	REX 95 High Speed	C .80, Cr 4.00, W 14.00, Mo .75, V 2.00, Co 5.25	Air, Oil or Liquid Bath
Cutting Tools (Roughing)	REX SUPERCUT High Speed	C .77, Cr 4.00, W 18.50, Mo .65, V 2.00, Co 8.00	Air, Oil or Liquid Bath
Cutting Tools (Roughing)	REX 440 High Speed	C .80, Cr 4.00, W 19.50, Mo .60, V 2.00, Co 12.00	Air, Oil or Liquid Bath
Cutting Tools (General Purpose)	REX AA High Speed	C .73, Cr 4.00, W 18.00, V 1.15	Air, Oil or Liquid Bath
Cutting Tools (General Purpose)	REX M-2 High Speed	C .83, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Air, Oil or Liquid Bath
Cutting Tools (General Purpose)	REX VM High Speed	C .85, Cr 4.00, Mo 8.00, V 1.90	Air, Oil or Liquid Bath
Cutting Tools (General Purpose)	REX TMO High Speed	C .80, Cr 3.75, W 1.55, Mo 8.70, V 1.15	Air, Oil or Liquid Bath
Cutting Tools (Finishing)	REX SUPERVAN High Speed	C .85, Cr 4.00, W 18.50, Mo .75, V 2.10	Air, Oil or Liquid Bath
Cutting Tools (Finishing)	REX 4V High Speed	C 1.25, Cr 4.00, W 18.50, Mo .75, V 4.00	Air, Oil or Liquid Bath
Cutting Tools (Finishing)	REX M-3 High Speed	C 1.05, Cr 4.00, W 5.75 Mo 5.00, V 2.50	Air, Oil or Liquid Bath
Cutting Tools (Finishing)	CRUCIBLE DOUBLE SPECIAL Water Hardening	C 1.30, W 3.50	Water or Brine
Cutting Tools	REXALLOY Cast Alloy	C 2.25, Cr 33.00, W 17.00, Co 44.00	
Die Casting (Lead, Manganese, Tin or Zinc Base)	CSM #2 Oil Hardening	C .40, Cr 5.00, Mo 1.35, Si 1.05, Si .50	Oil
Die Casting (Aluminum Base)	NuDIE V Air Hardening	C .40, Cr 5.00, Mo 1.35, Si 1.05, V 1.10	Air, Oil or Liquid Bath
Die Casting (Brass)	PEERLESS A Oil Hardening	C .28, Cr 3.25, W 9.00, V .25	Air, Oil or Liquid Bath
Die Casting (Brass)	HALCOMB T.M. Air Hardening	C .35, Cr 1.50, W 4.00, Mo .40, Co 5.00, Si .50	Air or Liquid Bath
Die Casting Dies (Hubbed Dies)	AIRMOLD DIE CASTING Die Steel Air Hardening	C .08, Cr 5.00, Mo .50	Air, Oil or Liquid Bath
Die Casting Dies (Parts)	REX AA High Speed	C .73, Cr 4.00, W 18.00, V 1.15	Air, Oil or Liquid Bath
Die Casting Dies (Parts)	REX M-2 High Speed	C .83, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Air, Oil or Liquid Bath
Die Casting Dies (Parts)	NuDIE V Air Hardening	C .40, Cr 5.00, Mo 1.35, V 1.10, Si 1.05	Air, Oil or Liquid Bath
Gages (Flat)	CRESCENT TOOL SHEET Water Hardening	C 1.00	Water or Brine
Gages (Snap)	CRESCENT SPECIAL (Listed above) Water Hardening		
Gages (Flat, Snap, Plug & Thread)	SS TOOL Oil Hardening	C 1.00, Mn .35, Cr 1.20, Mo .30	Oil or Water
Gages (Flat, Snap, Plug & Thread)	(See KETOS, AIRKOOL, HYCC, REX AA, REX M-2 and REXALLOY Listed above)		
Hot Work Dies (Forming, Punching & Shearing)	ATHA PNEU Oil Hardening	C .50, Cr 1.25, W 2.75, V .20	Oil
Hot Work Dies (Forming, Punching & Shearing)	HALCOMB 218 Air Hardening	C .40, Cr 5.00, Mo 1.35, V .35, Si 1.00	Air, Oil or Liquid Bath
Hot Work Dies (Forming, Punching & Shearing)	CHRO MOW Air Hardening	C .30, Cr 5.00, W 1.25, Mo 1,30, Si 1.00	Air, Oil or Liquid Bath
Hot Work Dies (Forming, Punching & Shearing)	C.C.S. Air Hardening	C .38, Si 1.15, Cr 5.25 W 4.75	Air, Oil or Liquid Bath
Hot Work Dies (Forming, Punching & Shearing)	PEERLESS A Oil Hardening	C .28, Cr 3.25, W 9.00, V .25	Air, Oil or Liquid Bath
Hot Work Dies (Forming, Punching & Shearing)	PEERLESS LCT #2 Oil Hardening	C .40, Cr 2.00, W 11.50, V .35	Air, Oil or Liquid Bath
Hot Work Dies (Forming, Punching & Shearing)	REX AA (PX Temper) High Speed	C .53, Cr 4.00, W 18.00, V 1.10	Air, Oil or Liquid Bath
Plastic Molding Dies (Machine Cut Cavity)	CRUSCA 12B Oil Hardening	C .10, Mn .50, Cr 1.60, Ni 3.50	Oil
Plastic Molding Dies (Machine Cut Cavity)	HALVAN Oil Hardening	C .45, Mn .70, Cr 1.00, V .20	Oil
Plastic Molding Dies (Machine Cut Cavity)	PLASTIC CSM #2 Oil Hardening	C .30, Mn .75, Cr .80, Mo .25, Si .50	Oil
Plastic Molding Dies (Machine Cut Cavity)	(See AIRKOOL, CHAMPION NON-CHANGEABLE, KETOS, NuDIE V, listed above)		
Plastic Molding Dies (Hubbed Cavities)	CRUSCA COLD HUBBING Water Hardening	C .05, Mn .15	Oil, Water

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Plastic Molding Dies (Hubbed Cavities)	FORMOLD Oil Hardening	C .07, Mn .40, Cr 1.35, Mo .20, Ni .55	Oil
Plastic Molding Dies (Hubbed Cavities)	HOBALLOY Oil Hardening	C .07, Mn .50, Cr .65, Ni 1.25	Oil
Plastic Molding Dies (Hubbed Cavities)	AIRMOLD PLASTIC MOLD Steel	C .08, Cr 5.00, Mo .50	Air, Oil or Liquid Bath
Plastic Molding Dies (Hubs)	See AIRDI 150, AIRKOOL, ATHA PNEU, KETOS, LaBELLE Silicon #2		
Plastic Molding Dies (Ejector Pins)	See NuDIE V, KETOS, listed above.		
Plastic Molding Dies (Ejector Pins)	VICTOR DRILL ROD Water or Oil Hardening	C 1.00	Water or Oil
Punching and Shearing	See AIRDI 150, AIRKOOL, ALVA EXTRA, ATHA PNEU, CHAMPION-NON CHANGEABLE, HALVAN, KETOS, LaBELLE SILICON #2, REX AA, REX M-2 listed above.		
Shock Resisting (Intermittent Impact)	ALVA EXTRA	C .95, V .20	Water, Brine
Shock Resisting (Intermittent Impact)	BLACK DIAMOND	C .95	Water, Brine
Shock Resisting (Repeated Impact)	See ATHA PNEU, LaBELLE SILICON #2, HALVAN listed above		

DARWIN & MILNER INC., 2345 St. Clair Ave., Cleveland 14, O. — Listing No. 16

Cold Forming	DARWIN BRAKE DIE Oil Hardening	C .50, Mn 1.00, Cr .85, Mo .15	Oil	Mach. 70
Cold Work Dies	CV Water Hardening	C .95, V .20	Water	Mach. 60 Movement B
Cold Work Dies	DARWIN # 1 Air Hardening	C 1.50, Mn .35, Cr 13.00, Mo .75, V .25, Si .40, Ni .40	Air	Mach. 45 Movement A
Cold Work Dies	DARWIN FLAME HRD Air Hardening	C .50, Mn 1.20, Cr 1.40, Mo .40, V .10, Si .50	Air	Mach. 75 Movement B
Cold Work Dies	H BRAND Oil Hardening	C .90, Mn 1.50, Mo .30, Si .25	Oil	Mach. 60 Movement A
Cold Work Dies	MINEOR Air Hardening	C 1.00, Mn .60, Cr 5.00, Mo 1.00, V .25, Si .40	Air	Mach. 50 Movement B
Cold Work Dies	OHT Oil Hardening	C .90, Mn 1.20, Cr .50, W .50, Si .35	Oil	Mach. 60 Movement A
Cold Work Dies	TEMPER TOUGH Oil Hardening	C .75, Mn .60, Cr .80, Mo .30, V .15, Si 1.15	Oil	Mach. 60 Movement B
Cold Work Dies (Blanking, Cold Forming)	NEOR Oil Hardening	C 2.10 Mn .60, Cr 13.00, Si .40, Ni .50	Oil	Mach. 40 Movement A
Cold Work Dies (Blanking, Cold Forming)	PRK-33 Air Hardening	C 1.40, Mn .30, Cr 13.00, Mo .60, Co 3.30, Si .60, Ni .50	Air	Mach. 50 Movement A
Cutting Tools	CANNON Oil, Air Hardening	C .70, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .35	Oil, Air	Mach. 65 Movement B
Cutting Tools	CANNON SPECIAL Oil, Air Hardening	C .80, Mn .25, Cr 4.00, W 18.00, Mo .60, V 2.00, Si .30	Oil, Air	Mach. 60 Movement B
Cutting Tools	DARWIN 505 Oil, Air Hardening	C .70, Mn .30, Cr 4.00, W 18.00, Mo .60, V 1.15, Co 5.00, Si .25	Oil, Air	Mach. 60 Movement B
Cutting Tools	DARWIN 505 SPECIAL Oil, Air Hardening	C .80, Mn .30, Cr 4.00, W 18.00, Mo .80, V 2.00, Co 8.00, Si .25	Oil	Mach. 55 Movement B
Cutting Tools	DARWIN 1366 Oil Hardening	C .80, Mn .30, Cr 4.00, W 18.00, Mo .80, V 2.00, Co 13.00, Si .25	Oil	Mach. 55 Movement B
Cutting Tools	DARWIN M-3 Oil Hardening	C 1.10, Cr 4.00, W 5.75, Mo 5.00, V 2.50	Oil	Mach. 60 Movement B
Cutting Tools	MT-6 Oil Hardening	C .85, Mn .25, Cr 4.00, W 6.00, Mo 6.00, V 1.50, Si .25	Oil	Mach. 65 Movement B
Fast Finishing	EE Water, Oil Hardening	C 1.50, Mn .30, Cr .20, W 4.50, V .35, Si .30	Oil, Water	Mach. 50 Movement B
Hot Work	DARWIN 93 Oil Hardening	C .30, Cr 3.00, W 9.00, V .45	Oil	Mach. 40 Movement A
Hot Work	FIREX SPECIAL Air Hardening	C .50, Mn .65, Cr .85, Mo .60, V .20, Si .30, Ni 4.00	Air	Mach. 40 Movement A
Hot Work	IWI Oil Hardening	C .45, Mn .25, Cr 4.00, W 15.00, V .70, Si .30	Oil	Mach. 50 Movement B
Hot Work Dies	HWA Air Hardening	C .35, Cr 5.00, Mo 1.00, V 1.00, Si 1.00	Air	Mach. 50 Movement B
Hot Work Dies	HWS Oil, Air Hardening	C .33, Cr 5.00, W 1.25, Mo 1.45, V .23, Si .85	Air, Oil	Mach. 50 Movement B
Plastic Molding	HOBALITE Water Hardening	C .05, Mn .15, Si .01	Water	Mach. 80 Movement B
Punches & Dies	SSC Water Hardening	C 1.00, Mn .30, Si .50	Water	Mach. 60 Movement C
Shock Resisting	STANDARD CHISEL Water, Oil Hardening	C .58, Mn .70, Mo .40, V .25, Si 1.85	Oil, Water	Mach. 60 Movement A
Shock Resisting	W BRAND Oil Hardening	C .45, Mn .35, Cr .80, W .85, Si .30	Oil	Mach. 60 Movement A
Shock Steel	IDEOR Oil Hardening	C .50, Mn .25, Cr 1.50, W 2.00, V .25, Si .30	Oil	Mach. 50 Movement A

DELAWARE TOOL STEEL CORP., 3300 Market St., Wilmington 99, Del. — Listing No. 17

Punching and Shearing, also Shock Resisting (Repeated Impact)	DELSTEEL ALLOY Water, Oil Hardening	C .50, Mn .35, Mo .55, V .25, Si .85	Water, Oil	Mach. 100 Movement B

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

DETROIT STEEL CORP., CRAINE-SCHRAGE STEEL DIVISION, 13770 Joy Rd., Detroit 28, Mich. — Listing No. 18

Cold Work Dies (Blanking)	CRASCO GREEN LABEL Water Hardening	C 1.00, Mn .15-.35, Si .15-.35	Water	Movement B
Cold Work Dies (Blanking)	CRASCO SPECIAL VANADIUM Water Hardening	C 1.00, Mn .15-.35, V .20, Si .15-.35	Water	Movement B
Cold Work Dies (Cold Forming)	CRASCO BLACK LABEL Air Hardening	C 1.50, Mn .35, Cr 12.00, Mo .80, V .20, Si .20-.35	Air	Movement A
Cold Work Dies (Cold Forming)	CRASCO RED LABEL Oil Hardening	C .90, Mn 1.15, Cr .50, W .50, Si .20-.35	Oil	Movement A
Gages	CRASCO RED LABEL ....(Listed Above)			
Plastic Molding Dies (Hubs)	(See CRASCO BLACK LABEL, CRASCO RED LABEL, Listed Above)			
Plastic Molding Dies (Machine Cut Cavity Dies)	CRASCO YELLOW LABEL Oil Hardening	C .50, Mn .80, Cr 1.00, V .20	Oil	Movement A
Plastic Molding Dies (Machine Cut Cavity Dies)	CRASCO RED LABEL ....(Listed Above)			
Punching and Shearing	CRASCO Special Vanadium..(Listed Above)			
Shock Resisting (Intermittent Impact)	CRASCO YELLOW Label...(Listed Above)			

DIEHL STEEL CO., 236 Broadway, Cincinnati 2, O. — Listing No. 19

Cold Work Dies (Blanking, Cold Forming)	GRADE "A" Water Hardening	C .95, Mn .30, Si .20	Water	Movement —A
Cold Work Dies (Blanking, Cold Forming)	UTEX Oil Hardening	C .95, Mn 1.00, Cr .50, W .60, V .25, Si .25	Oil	
Cold Work Dies (Cold Forming)	HICRO Oil Hardening	C 1.55, Mn .25, Cr 12.00, Mo .80, V .35, Si .35	Oil, Air	
Cold Work Dies (Punches, Small Tools)	VERI BEST DRILL ROD Oil Hardening	C .95, Mn 1.05, Cr .55, W .65, V .15, Si .35	Oil	
Cutting Tools	BLUE STREAK MOLY Oil Hardening, High Speed	C .80, Cr 4.00, W 5.75, Mo 4.50, V 1.60	Oil	
Cutting Tools	BLUE STREAK 18-4-1 Oil Hardening	C .72, Cr 4.00, W 18.00, V 1.00	Oil	
Hot Work Dies	A. M. D. Air Hardening	C .34, Mn .40, Cr 4.75, W 1.10, Mo 1.45	Air	
Punching, Shearing	(See Grade "A", UTEX, Listed Above)			
Ring Cold Work Dies	HOLLOBAR Oil Hardening	C 1.05, Mn .38, Cr 1.46, Si .28	Oil	

HENRY DISSTON & SONS INC., Unruh & Milnor Sts., Philadelphia 35, Pa. — Listing No. 20

Cold Work Dies	NICROMAN Oil Hardening	C .70, Mn .45, Cr 1.00, Si .20, Ni 1.65	Oil	Mach. 80 Movement A
Cold Work Dies (Blanking, Cold Forming)	BEST CARBON Water Hardening	C as ord., Mn .20, Si .20	Water	Mach. 100 Movement B
Cold Work Dies (Blanking, Cold Forming)	CROLOY Oil Hardening	C 1.50, Mn .30, Cr 12.00, Mo .80, V .95, Si .30	Oil	Mach. 60 Movement A
Cold Work Dies (Blanking, Cold Forming)	D-9-Mo Water Hardening	C 1.15, Mn .60, Mo .20, Si .50	Water	Mach. 95 Movement A
Cold Work Dies (Blanking, Cold Forming)	D-9-Va Water, Oil Hardening	C 1.15, Mn .60, V .20, Si .60	Oil, Water	Mach. 95 Movement A
Cold Work Dies (Blanking, Cold Forming)	MANSIL Oil Hardening	C .90, Mn 1.15, Cr .50, W .50, Si .35	Oil	Mach. 85 Movement A
Cold Work Dies (Blanking, Cold Forming)	VA-TOOL Water Hardening	C .95, Mn .25, Cr .15, V .25, Si .20	Water	Mach. 95 Movement A
Cutting Tools	(See D-9-Mo, D-9-Va, Listed Above)			
Cutting Tools (Finishing)	D-6-CO Oil Hardening	C .75, Mn .25, Cr 4.00, W 18.25, Mo .65, V 2.00, Co 5.75, Si .20	Oil	Mach. 55 Movement B
Cutting Tools (Finishing)	No. 844 Oil Hardening	C .85, Mn .30, Cr .80, Si .25	Oil	Mach. 80 Movement B
Cutting Tools (Finishing, Grass, Leather, etc.)	No. 871 Oil Hardening	C .55, Mn .65, Mo .20, Si .20	Oil	Mach. 90 Movement B
Cutting Tools (Finishing, Wood, Plastic)	POLARIS Oil Hardening	C .85, Mn .30, Cr .15, Si .25, Ni .70	Oil	Mach. 100 Movement A
Cutting Tools (Finishing)	TUNGSTEN HACK Oil Hardening	C .90, Mn .20, W 1.00, V .15, Si .15	Oil	Mach. 85 Movement B
Cutting Tools (Roughing, Finishing)	DI-MOL Oil Hardening	C .80, Mn .25, Cr 4.00, W 1.55, Mo 8.50, V 1.15, Si .25	Oil	Mach. 65 Movement A
Cutting Tools (Roughing, Finishing)	KUTKWIK Oil Hardening	C .75, Mn .25, Cr 4.00, W 18.25, Mo .80, V 1.10, Si .25	Oil	Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	6N6-M2 Oil Hardening	C .82, Mn .25, Cr 4.25, W 6.35, Mo 5.00, V 1.90, Si .35	Oil	Mach. 65 Movement A
Die Casting Dies	No. 872 Oil Hardening	C .35, Mn .30, Cr 3.25, W 9.25, V .30, Si .35	Oil	Mach. 80 Movement A
Hot Work Dies (Punching, Shearing, Forming)	No. 873 Oil Hardening	C .38, Mn .35, Cr 5.00, W 1.25, Mo 1.35, V .40, Si 1.00	Oil	Mach. 85 Movement A
Hot Work Dies (Forming)	KEYSTONE Oil Hardening	C .50, Mn .30, Cr 1.10, W 2.00, V .20, Si .20	Oil	Mach. 85 Movement B
Hot Work Dies (Forming)	No. 872 ....(Listed Above)			
Plastic Molding Dies (Hubs)	CROLOY ....(Listed Above)			
Plastic Molding Dies (Hubbed Cavity Dies)	PLASTALLOY Water Hardening	C .10 Max., Mn .45, Cr .50, Si .20, Max., Ni 1.20	Water	Mach. 95 Movement B
Plastic Molding Dies (Hubbed Cavity Dies)	PLASTIRON Water Hardening	C .10 Max., Mn .15, Si .20 Max.	Water	Mach. 95 Movement B
Punching, Shearing	EXTRA CARBON Water Hardening	C 1.00, Mn .20, Si .20	Water	Mach. 100 Movement B
Punching, Shearing	STANDARD Water Hardening	C 1.00, Mn .20, Si .20	Water	Mach. 100 Movement B
Punching, Shearing	812 DIE Oil Hardening	C 1.80, Mn .30, Cr 12.25, Si .25	Oil	Mach. 50 Movement A

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Punching, Shearing	(See BEST CARBON, CROLOY, MANSIL, NICROMAN, Listed Above)		
Shock Resisting (Repeated Impact)	D29 Oil Hardening	C .55, Mn .80, Mo .40, Si 1.35	Oil Mach. 80 Movement B
Shock Resisting (Repeated Impact)	KEYSTONE (Listed Above)		

FAITOUTE IRON & STEEL CO. INC., 182 Frelinghuysen Ave., Newark 5, N. J. — Listing No. 21

Cold Work Dies	FISCO CARBON Water Hardening	C 1.05, Mn .25, Si .24	Water Movement C
Cold Work Dies	FISCO CHROMDIE Oil, Air Hardening	C 1.60, Mn .28, Cr 12.00, Mo .85, V .23, Si .38	Air Movement A
Cold Work Dies	FISCO OILHARD Oil Hardening	C .90, Mn 1.15, Cr .50, W .50, V .20, Si .30	Oil Movement A
Cold Work Dies	FISCO SPECIAL Water Hardening	C 1.05, Mn .25, Si .24	Water Movement C
Cutting Tools	FISCO HIGH SPEED High Speed	C .72, Mn . 28, Cr 4.00, W 18.00, V 1.00, Si .22	Oil Movement B
Cutting Tools	(See FISCO CARBON, FISCO SPECIAL, Listed Above)		
Shock Resisting (Intermittent Impact)	FISCO DUPLEX Water Hardening	C .95, Mn .25, Si .25	Water Movement C
Shock Resisting (Repeated Impact)	FISCO OMEGA Water, Oil Hardening	C .55, Mn .80, Mo .50, V .25, Si 2.30	Oil Movement B

A. FINKL & SONS CO., 2011 Southport Ave., Chicago 14, Ill. — Listing No. 22

Hot Work Dies (Hot Forgings)	F Water Hardening	C, Mn	Water Movement B
Hot Work Dies (Hot Forming)	CUPRODIE	Cr, Mo, Cn, Ni	
Hot Work Dies (Hot Forming)	DURODI Oil, Air Hardening	Cr, Mo, Si, Ni	Oil, Air Blast Movement A
Hot Work Dies (Hot Forming)	FS	Cr, Mo, Ni	
Hot Work Dies (Hot Forming)	FX	Cr, Mo, Ni	
Hot Work Dies (Hot Forming)	SHELLDIE Oil, Air Hardening	Cr, Mo, Si	Oil, Air Blast Movement A
Punching, Shearing (Cold, Hot Trimming)	COLD HOT Water, Oil Hardening	Cr, Mo	Oil, Water Movement A

FIRTH STERLING INC., 2201-3299 Demmler Rd., McKeesport, Pa. — Listing No. 23

Boring Tool (Hardest Material)	FIRTHITE HF, Carbides	WC 97, Co 3	
Boring Tool (High Speed)	FIRTHITE T31, Carbides	WC 67, Co 8, Ti 25	
Cold Work Dies	AIRVAN Air Hardening	C 1.00, Mn .65, Cr 5.25, Mo 1.15, V .30, Si .35	Air, Oil Mach. 70 Movement A
Cold Work Dies	A.W. SPECIAL Water, Oil Hardening	C 1.00, Mn .20, Cr 1.40, V .20, Si .25	Water, Oil Mach. 85 Movement A
Cold Work Dies	BLUE CHIP High Speed	C .72, Mn .25, Cr 4.10, W 18.20, V 1.15, Si .30	Oil, Air Mach. 55 Movement A
Cold Work Dies	CIRCLE C High Speed	C .76, Mn .25, Cr 4.75, W 18.50, Mo 1.00, V 2.00, Co 9.00, Si .25	Oil, Air Mach. 40 Movement A
Cold Work Dies	CROMOVAN DIE Air Hardening	C 1.55, Cr 12.00, Mo .95, V .90	Air, Oil Mach. 45 Movement A
Cold Work Dies	F. S. EXTRA C.H.Q.	C .93	Brine, Water Mach. 100 Movement C
Cold Work Dies	RED CHIP High Speed	C .75, Mn .25, Cr 4.00, W 18.00, Mo .75, V 1.15, Co 5.00, Si .30	Oil, Air Mach. 50 Movement A
Cold Work Dies	FS2-5 High Speed	C .80, Mn .25, Cr 4.00, W 14.00, Mo .75, V 2.00, Co 5.25, Si .30	Oil, Air Mach. 45 Movement A
Cold Work Dies	HI-MO High Speed	C .80, Mn .25, Cr 3.95, W 1.80, Mo 8.50, V 1.20, Si .30	Oil, Air Mach. 60 Movement A
Cold Work Dies	HI-MO-V High Speed	C .85, Mn .25, Cr 4.25, W .00, Mo 8.25, V 1.90, Si .25	Oil, Air Mach. 60 Movement A
Cold Work Dies	H.V. BLUE CHIP High Speed	C .83, Mn .25, Cr 4.00, W 18.50, Mo .75, V 2.10, Si .30	Oil, Air Mach. 45 Movement A
Cold Work Dies	INVARO Oil Hardening	C .90, Mn 1.15, Cr .50, W .50, V .20	Oil Mach. 90 Movement A
Cold Work Dies	METEOR Water, Oil Hardening	C 1.20, Mn .30, Cr .25, W 1.50, V .15	Water, Oil Mach. 85 Movement A
Cold Work Dies	MO CHIP High Speed	C .59, Mn .25, Cr 5.00, W .00, Mo 8.00, V 1.25, Co 2.50, Si .25, B .25	Oil, Air Mach. 55 Movement A
Cold Work Dies	NITRARD No. 1 Air Hardening	C 1.55, Cr 12.00, Mo .95, V .90	Oil, Air Mach. 45 Movement A
Cold Work Dies	SILVER DIE No. 1 Water Hardening	C .95, Mn .28, Cr .05, V .12, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies	SILVER DIE No. 2 Water Hardening	C .95, Mn .45, Si .45	Brine, Water Mach. 100 Movement C
Cold Work Dies	STAR BLUE CHIP High Speed	C .73, Mn .25, Cr 4.75, W 14.00, V 1.65, Si .25	Oil, Air Mach. 55 Movement A
Cold Work Dies	STAR-MO M2 High Speed	C .82, Mn .25, Cr 4.15, W 6.20, Mo 5.00, V 1.90, Si .25	Oil, Air Mach. 55 Movement A
Cold Work Dies	SUPER HI-MO High Speed	C .80, Mn .25, Cr 3.95, W 1.80, Mo 8.50, V 1.20, Co 5.00, Si .25	Oil, Air Mach. 55 Movement A
Cold Work Dies	SUPER MO CHIP High Speed	C .59, Mn .25, Cr 4.20, W 1.65, Mo 8.15, V 1.80, Co 8.20, Si .25, B .50	Oil, Air Mach. 40 Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies	SUPER STAR-MO High Speed	C .84, Mn .25, Cr 4.10, W 5.50, Mo 4.50, V 1.80, Co 9.00, Si .25	Oil, Air Mach. 45 Movement A
Cold Work Dies	TRIPLE DIE Oil Hardening	C 2.20, Cr 12.00, V .15	Oil, Air Mach. 40 Movement A
Cold Work Dies, Tools	Diamond M Water Hardening	C 1.30, Mn .28, Cr .28, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. BEST Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. EXTRA Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. SPECIAL Water Hardening	C As Spec., Mn .28, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	GLOBE DRILL ROD Water Hardening	C 1.25, Mn .30, Cr .12, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SILVAN STAR Water Hardening	C 1.05, Mn .30, Cr .10, V .20, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SILVER STAR Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SPECIAL A.S.V. Water Hardening	C As Spec., Mn .25, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SPECIAL XX Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STERLING Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STERLING V Water Hardening	C As Spec., Mn .35, Cr .15, V .20, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STERLING XX Water Hardening	C As Spec., Mn .30, Cr .08, Si .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STER M Water Hardening	C 1.25, Mn .30, Cr .25, Si .20	Brine, Water Mach. 100 Movement C
Cutting Tools (Light Interrupted Cuts, Slow Speeds)	FIRTHITE H, Carbide	WC 94, Co 6	
Cutting Tools (Rough Intermittent Cuts, Coarse Feeds)	FIRTHITE HB, Carbide	WC 92, Co 8	
Cutting Tools (Strongest WC grade, Skiving)	FIRTHITE HC, Carbide	WC 87, Co 13	
Cutting Tools (Light Cuts, Fine Feeds, except steel)	FIRTHITE HE, Carbide	WC 96, Co 4	
Cutting Tools (Heavy Duty)	FIRTHITE T04, Carbide	WC 86, Co 10, Ti 4	
Cutting Tools (Light Steady Cuts, Fine Feeds)	FIRTHITE T16, Carbide	WC 76, Co 8, Ti 16	
Cutting Tools (Heavier Duty on Steel than T83)	FIRTHITE T66, Carbide	WC 60, Co 12, Ta 28	
Cutting Tools (Medium Feed, Stronger than AA)	FIRTHITE T83, Carbide	WC 82, Co 8, Ti 10	
Cutting Tools (Medium Feeds, more crater resisting than TA)	FIRTHITE T89, Carbide	WC 73, Co 10, Ti 12, Ta 5	
Cutting Tools (Finishing)	R.T. STEEL Water Hardening	C 1.30, Mn .35, Cr .25, W 3.50	Brine, Water Mach. 60 Movement C
Cutting Tools	(See BLUE CHIP, CIRCLE C, RED CHIP, FS2-5, HI-MO, HI-MO-V, H.V. BLUE CHIP, MO CHIP, STAR BLUE CHIP, STAR-MO M2, SUPER HI-MO, SUPER MO CHIP, SUPER STAR-MO, Listed Above)		
Cutting Tools	VAN CHIP	C 1.15, Cr 4.10, W 6.00, Mo 5.75, V 3.00	Oil, Air Mach. 55 Movement A
Cutting Tools	VAN CHIP (Mod.)	C 1.00, Cr 4.10, W 6.00, Mo 5.75, V 2.50	Air, Oil Mach. 50 Movement A
Die Casting Dies	B.D.C. Oil, Air Hardening	C .33, Mn .35, Cr 12.00, W 12.00, V 1.05, Si .35	Oil, Air Mach. 50 Movement A
Die Casting Dies	H.W.D. Oil, Air Hardening	C .35, Mn .60, Cr 5.00, W 1.40, Mo 1.55, V .25, Si 1.00	Air, Oil Mach. 75 Movement A
Die Casting Dies	L.T. FORGING DIE Oil, Air Hardening	C .33, Cr 3.50, W 9.50, V .35	Air, Oil Mach. 60 Movement A
Drawing Dies	R.T. STEEL	(Listed Above)	
General Purpose	FIRTHITE HA, Carbide	WC 95, Co 5	
General Purpose	FIRTHITE TA, Carbide	WC 84, Co 6.5, Ti 9.5	
Hot Work Dies	C.Y.W. Oil, Air Hardening	C .95, Mn .50, Cr 3.60	Air, Oil Mach. 80 Movement A
Hot Work Dies	HOT WORK BLUE CHIP Oil, Air Hardening	C .58, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 60 Movement A
Hot Work Dies	XDH Oil, Air Hardening	C .50, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 60 Movement A
Hot Work Dies	XDL Oil, Air Hardening	C .38, Cr 3.50, Cr 14.00, V .35	Oil, Air Mach. 65 Movement A
Hot Work Dies	XDM Oil, Air Hardening	C .45, Cr 4.00, W 17.50, V .35	Oil, Air Mach. 60 Movement A
Hot Work Dies	(See B.D.C., H.W.D., L.T. FORGING DIE, Listed Above)		
Punching and Shearing	CHIMO PUNCH Water, Oil Hardening	C .55, Mn .95, Cr .15, Mo .50, V .15, Si 2.00	Water, Oil Mach. 85 Movement B
Punching and Shearing	DEMMLER D Water, Oil Hardening	C .50, Mn .75, Cr 1.00, V .20, Si .25	Water, Oil Mach. 75 Movement C
Punching and Shearing	J.S. PUNCH Oil Hardening	C .50, Mn .30, Cr 1.40, W 2.50, V .20	Oil Mach. 80 Movement A
Shock Resisting	(See CHIMO PUNCH, DEMMLER D, J.S. PUNCH, Listed Above)		
Shock Resisting (Bolt Heading)	FIRTHITE ND20, Carbide	WC 75, Co 20, Ta 5	
Shock Resisting (Punches, Cold Heading)	FIRTHITE ND25, Carbide	WC 70, Co 25, Ta 5	
Wear Parts (Guides, Gage Blocks)	FIRTHITE T41H, Carbide	WC 82, Co 8, Ta 10	

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

HAYNES STELLITE CO., S. Lindsay St., Kokomo, Ind. — Listing No. 24

Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed, Feed, Heavy Cut)	STELLITE Star J-Metal Alloy (Cast Alloy)	Cr 32, W 17, Co 41, C 2.50	
Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed and Feed)	STELLITE #3 Alloy (Cast Alloy)	Cr 30, W 11, Co 52, C 2.50	
Cutting Tools (Roughing, Finishing) (Withstands Severe Shock)	STELLITE #19 Alloy (Cast Alloy)	Cr 31, W 10, Co 53, C 1.50	
Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed)	STELLITE 98 M2 Alloy (Cast Alloy)	Cr 30, W 18, Co 38, C 2.00	
Hot Punching, Hot Shearing (Hard-Facing Material)	HASTELLOY ALLOY C* Nickel Base Alloy	Cr 16, W4, Mo 17, Fe 6, Ni Bal C .15 max	
Hot Punching, Hot Shearing (Hard-Facing Material)	STELLITE ALLOY NO. 6* Cast Alloy	Cr 30, W 5, Co 56, C 1.25	
Shock Resisting (Hard-Facing Material)	STELLITE ALLOY NO. 12* Cast Alloy	Cr 31, W 8, Co 56, C 1.35	

* These alloys are available in castings for the services specified. Hasteloy alloy C and Stellite alloy No. 6 are also recommended for shock resisting service.

HEPPENSTALL CO., 4620 Hatfield St., Pittsburgh 1, Pa. — Listing No. 25

Cold Shearing	EIS R43 Oil, Air Hardening	C 1.55, Mn .25, Cr 11.50, W .75, Mo .75, Si .35	Air, Oil
Cold Shearing	EIS R45 Oil, Air Hardening	C .85, Mn .25, Cr 11.50, Mo .45, Si .35	Air, Oil
Cold Shearing	EIS R97 Oil Hardening	C .58, Mn 1.00, Cr .30, Mo .40 Si 2.15	Oil
Cold Shearing	EIS V2 Water Hardening	C .80, Mn .40, V .10, Si .60	Water
Cold Shearing	EIS V3 Water Hardening	C .95, Mn .40, V .10, Si .60	Water
Cold Work Dies	(See EIS R43, EIS R45, Listed Above)		
Cold Work Dies	2V72 Water Hardening	C .80, Mn .40, V 10, Si .60	Water
Cold Work Dies	2V90 Water Hardening	C .95, Mn .40, V .10, Si .60	Water
Die Casting Dies (Zinc, Aluminum)	EIS H720 Oil, Air Hardening	C .40, Mn .30, Si 1.00, Cr 5.25, Mo 1.10, V 1.00	Air, Oil
Die Casting Dies (Zinc, Aluminum)	EIS T721 Oil, Air Hardening	C .35, Mn .35, Si 1.00, Cr 5.00, Mo 1.50, W 1.25, V 20	Air, Oil
Hot & Cold Trimming	EIS H41 Oil, Air Hardening	C .95, Mn .30, Cr 4.00, M .25, V .20, Si .25	Air, Oil
Hot & Cold Trimming	EIS T51 Oil Hardening	C .65, Mn .70, Cr .70, W 2.25, Si .30, Ni 1.50	Oil
Hot Shearing	EIS R718 Oil, Air Hardening	C .35, Mn .30, Cr 5.00, Mo 2.00, Si 1.00	Air, Oil
Hot Shearing	EIS T73 Oil, Air Hardening	C .28, Mn .30, Cr 3.50, W 9.00, V .25, Si .45	Air, Oil
Hot Shearing	EIS T77 Oil, Air Hardening	C .33, Mn .30, Cr 4.00, W 12.00, V .25, Si .30	Air Oil
Hot Work Dies	"C" ANNEAL Oil Hardening	C .55, Mn .80, Cr 1.00, Mo .45, V .03, Si .25	Oil
Hot Work Dies	C55 Oil Hardening	C .55, Mn .50, Cr .90, Mo .30, Si .25, Ni 1.50	Oil
Hot Work Dies	C57 Oil, Air Hardening	C .55, Mn .60, Cr 1.00, Mo .75, Si .60, Ni 2.15	Air, Oil
Hot Work Dies	5H50 Oil Hardening	C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	Oil
Hot Work Dies	HARDTEM Prehardened	C .55, Mn .80, Cr 1.00, Mo .45 V .08, Si .25	
Hot Work Dies	PRESNEAL Oil, Air Hardening	Special Precipitation Hardening Alloy Steel	Air, Oil
Hot Work Dies	PRESTEM Prehardened	Special Precipitation Hardening Alloy Steel	
Hot Work Dies	PYRONEAL Oil, Air Hardening	C .55, Mn .60, Cr 1.00, Mo .75, Si .60, Ni 2.15	Air, Oil
Hot Work Dies	PYROTEM Prehardened	C .55, Mn .60, Cr 1.00, Mo .75, Si .60, Ni 2.15	
Hot Work Dies	SILVER HARDTEM Prehardened	C .35, Mn .30, Cr 5.00, Mo 2.00, Si 1.00, Ag .20	
Hot Work Dies	THERMONEAL Oil, Air Hardening	C .35, Mn .30, Si 1.00, Cr 5.00, Mo 2.00	Air, Oil
Hot Work Dies	THERMOTEM Prehardened		
Hot Work Dies	(See EIS T73, EIS T77, EIS T721, EIS R718, Listed Above)		
Plastic Molding Dies	EIS H5 Oil, Hardening	C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	Oil
Plastic Molding Dies	(See HARDTEM, Listed Above)		

HIDALGO STEEL CO. INC., 74 Varick St., New York, N. Y. — Listing No. 26

Cutting Tools	MILO Water, Oil Hardening		Water, Oil
Cutting Tools	UNICO Water, Oil Hardening		Water Hardening§ Oil Hardening**
Punching and Shearing	FUEGO Water Hardening		Water
Shock Resisting	COLOSSO Water Hardening		Water
Shock Resisting	MILO (Listed Above)		

§ Draw to straw color ** No drawing needed

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
HOUGHTON & RICHARDS INC., 19 Jersey St., Boston 15, Mass.			**Listing No. 27**
Brake Dies	H & R BRAKE DIE	C .50, Mn 1.00, Cr .95, Mo .20	
Carbide Shank Steel	H & R No. 8 Water, Oil Hardening	C .60, Mn .70, Mo .45, V .20, Si 1.85	Water, Oil Mach. 65 Movement + B
Carbide Shank Steel	H & R No. 8M Water, Oil Hardening	C .55, Mn .75, Mo .20, Si 2.00	Water, Oil Mach. 85 Movement + B
Carbide Shank Steel	H & R N150 Oil Hardening	C per temper, Mn .55, Cr .85, Mo .42, Si .30, Ni 1.40	Oil Mach. 75 Movement + A
Cold Heading	H & R HEADING DIE Water Hardening	C .90-1.00, Mn .20, Si .30	Brine Mach. 100 Movement + C
Cold Work Dies (Blanking, Cold Forming)	H & R GOLD LABEL Water Hardening	C 1.33, Mn .35, W 4.25, Mo .35, Si .49	Brine, Water Mach. 70 Movement + C
Cold Work Dies (Blanking, Cold Forming)	H & R K Oi lHardening	C 2.32, Mn .32, Cr 13.00, V .22, Si .22	Oil Mach. 40 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R K-2 Oil, Air Hardening	C 1.50, Mn .25, Cr 11.50, Mo .75, V .25, Si .30	Oil, Air Mach. 45 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R K-2L Air, Oil Hardening	C .85, Ni 1.00, Mo .45, Cr 11.50, V .30	Oil, Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R K-3 Air Hardening	C 2.40, Si .25, Mn .25, Cr 13.00, V 4.00, Mo 1.00	Air Mach. 40 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 50 Oil Hardening	C .58, Mn .25, Cr 4.10, W 18.00, V 1.13, Si .25	Oil Mach. 55 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R OIL HARDENING Oil Hardening	C .95, Mn .95, Cr .55, Si .20,	Oil Mach. 90 Movement + B
Cold Work Dies (Blanking, Cold Forming)	H & R TUNGSTEN OIL HARDENING Oil Hardening	C .90, Mn 1.10, Cr .50, W .50, V .20, Si .25	Oil Mach. 90 Movement + B
Cold Work Dies (Blanking, Cold Forming)	H & R No. 19 Oil Hardening	C .92, Mn 1.55, Cr .18, Si .32	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 60 Water, Oil Hardening	C 1.20, Mn .25, Cr .70, W 1.60, Mo .25, V .20, Si .30	Water, Oil Mach. 85 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 61 Air Hardening	C 1.35, Mn .25, Cr 12.12, Mo .64, Co 3.04, Si .50	Air Mach. 60 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 80 Air Hardening	C 1.00, Mn .65, Cr 5.25, Mo 1.10, V .25, Si .20	Air Mach. 85 Movement + A
Cutting Tools (Finishing)	H & R No. 44 High Speed	C .80, Mn .30, Cr 4.10, Mo 4.25, V 1.10, Si .25	Oil Mach. 60 Movement + A
Cutting Tools (Finishing)	H & R No. 59 High Speed	C .88, Mn .30, Cr 4.10, Mo 4.25, V 1.82, Si .25	Oil Mach. 55 Movement + A
Cutting Tools (Finishing)	H & R No. 88 High Speed	C .90, W 1.50, Cr 8.25, V 1.50, Mo 9.00, Co 4.00	Oil Mach. 50 Movement + A
Cutting Tools (Finishing)	H & R No. 434 High Speed	C 1.18, Mn .30, Cr 4.10, Mo 4.25, V 3.15, Si .25	Oil Mach. 50 Movement + A
Cutting Tools (Finishing)	H & R No. 444 High Speed	C 1.40, Mn .30, Cr 4.10, Mo 4.25, V 4.15, Si .25	Oil Mach. 45 Movement + A
Cutting Tools (Roughing)	H & R SUPER COBALT High Speed	C .80, Mn .20, Cr 4.25, W 20.50, Mo .60, V 1.35, Co 12.25, Si .32	Oil, Air, Salt Bath Mach. 40 Movement + A
Cutting Tools (Roughing)	H & R No. 4 High Speed	C .80, Cr 4.50, W 18.50, Mo .80, V 1.75, Co 7.50	Oil, Air, Salt Bath Mach. 45 Movement + A
Cutting Tools (Roughing)	H & R No. 48 High Speed	C .81, Mn .30, Cr 4.10, W 1.70, Mo 8.30, V 1.25, Co 5.00, Si .30	Oil Mach. 50 Movement + A
Cutting Tools (Roughing)	H & R No. 488 High Speed	C .80, Mn .25, Cr 4.15, W 1.55, Mo 8.30, V 1.25, Co 7.50, Si .30	Oil Mach. 50 Movement + A
Cutting Tools (Roughing, Finishing)	H & R COBALT High Speed	C .78, Cr 4.00, W 18.00, V 1.00, Co 5.00	Oil, Air, Salt Bath Mach. 50 Movement + A
Cutting Tools (Roughing, Finishing)	H & R COBALT MOLY High Speed	C .88, Mn .25, Cr 4.10, W 6.00, Mo 6.00, V 1.90, Co 9.00, Si .25	Oil Mach. 45 Movement + A
Cutting Tools (Roughing, Finishing)	H & R MOLYHI High Speed	C per temper, Cr 4.00, W 1.50, Mo 8.50, V 1.15	Oil, Air, Salt Bath Mach. 55 Movement + A
Cutting Tools (Roughing, Finishing)	H & R MOLY VAN High Speed	C .82, Cr 4.00, Mo 9.00, V 2.20	Oil, Air, Salt Bath Mach. 60 Movement + A
Cutting Tools (Roughing, Finishing)	H & R SUPER MOLYHI High Speed	C .82, Mn .25, Cr 4.00, W 1.50, Mo 8.50, V 1.25, Co 5.00, Si .32	Oil, Air, Salt Bath Mach. 50 Movement + B
Cutting Tools (Roughing, Finishing)	H & R No. 1 High Speed	C .70, Mn .20, Cr 4.00, W 18.00, V 1.00, Si .30	Oil, Air, Salt Bath Mach. 55 Movement + A
Cutting Tools (Roughing, Finishing)	H & R No. 2 High Speed	C .80, Cr 4.25, W 18.50, Mo .65, V 2.15, Si .35	Oil, Air, Salt Bath Mach. 45 Movement + A
Cutting Tools (Roughing, Finishing)	H & R No. 3 High Speed	C 1.04, Mn .26, Cr 4.18, W 18.46, Mo .84, V 3.41, Si .27	Oil, Air, Salt Bath Mach. 50 Movement + A
Cutting Tools (Roughing, Finishing)	H & R No. 7 High Speed	C 1.15, Mn .25, Cr 4.00, W 6.00, Mo 6.00, V 3.00, Si .25	Oil Mach. 50 Movement + A
Cutting Tools (Roughing, Finishing)	H & R No. 57 High Speed	C .80, Mn .25, Cr 4.00, W 6.00, Mo 5.00, V 1.90, Si .25	Oil, Air, Salt Bath Mach. 55 Movement + A
Cutting Tools (Roughing, Finishing)	H & R No. 445 High Speed	C 1.50, W 13.50, Cr 4.50, V 4.75, Co 5.00, Mo .50	Oil, Mach. 40 Movement + A
Cutting Tools (Also Hot and Cold Work Dies)	H & R No. 45 High Speed	C .65, W 6.50, Cr 4.00, V 2.00, Mo 5.00	Oil Mach. 60 Movement + A
Die Casting Dies	H & R HOT WORK No. 5 (Hot Work Type)	C .35, Mn .35, Cr 5.00, Mo 1.00, Si 1.00, V .40	Air Mach. 65 Movement + A
Die Casting Dies	H & R HOT WORK No. 6 (Hot Work Type)	C .35, Mn .35, Cr 5.00, W 1.35, Mo 1.75, Si 1.00	Air Mach. 75 Movement + A
Die Casting Dies	H & R HOT WORK No. 7 (Hot Work Type)	C .55, Mn .30, Cr 5.00, W 1.20, Mo 1.20, Si .95	Air, Oil Mach. 85 Movement + A
Die Casting Dies	H & R No. 55 High Speed	C .35, Mn .25, Cr 5.25, W 5.25, Mo .20, V .20, Co .50, Si .90	Air Mach. 65 Movement + A
Heading Dies	H & R SPECIAL HEADING DIE Water Hardening	C .90-1.00, Mn .20, Si .30	Brine Mach. 100 Movement + C
Hot Work Dies (Hot Forming)	H & R No. 550 (Hot Work Type)	C .30, Si .40, W 1.00, Mo 6.25, Cr 3.75, V .75	Oil Mach. 75 Movement + B
Hot Work Dies (Hot Forming)	H & R HOT WORK No. 12 (Hot Work Type)	C .30, Mn .35, Cr 12.00, W 12.00, V .90, Si .50	Air, Oil Mach. 50 Movement + A

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK (Hot Work Type)	C .32, Cr 3.25, W 10.25, V .40, Si .28	Oil, Dry Air Blast Mach. Movement + A 60
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 2 (Hot Work Type)	C .33, Mn .20, Cr 3.50, W 9.25, V .50, Si .30	Oil, Water Mach. 60 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 4 (Hot Work Type)	C .97, Mn .35, Cr 3.90, Si .35	Air Blast Mach. 80 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 15 (Hot Work Type)	C .25, Mn .29, Cr 4.03, W 15.10, V .51, Si .26	Oil Mach. 65 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	MYA Oil Hardening	C .42, Mn .30, Cr 1.45, V .25, Si 1.45	Oil Mach. 55 Movement + B
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R No. 225 Oil, Air Hardening	C .50, Mn .25, Cr 1.50, W 2.50, V .25, Mo .50 max	Oil, Air Mach. 80 Movement + A
Hot Work Dies (Hot Punching, Hot Shearing)	H & R No. 555 Hot Work Type	C .50, Si .50, W 1.00, Mo 6.25, Cr 3.75, V .75	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See H & R HOT WORK No. 5, H & R HOT WORK No. 6, H & R No. 55,Listed Above)		
Pistons	H & R PISTON Water Hardening	C 1.14, Mn .32, Cr .58, V .19, Si .21,	Water Mach. 80 Movement + C
Plastic Molding Dies (All Types)	MYA (Listed Above) Oil Hardening		
Plastic Molding Dies (Machined Cavity Dies)	H & R MULTIMOLD Oil Hardening	C .35, Mn .70, Si .45, Cr .80, Mo .30	Oil
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD Air Hardening	C .07, Mn .40, Si .25, Cr 4.50, Mo .45	Air Movement + A
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD B Oil Hardening	C .06, Mn .30, Si .15, Cr 1.00, Mo .25, Boron Added	Oil Movement + B
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD C Oil Hardening	C .06, Mn .15, Si .10	Oil Movement + B
Punching and Shearing	H & R CARBON Water Hardening	C .90-1.05 or as specified, Mn .25, Si .20	Water, Brine Mach. 100 Movement + C
Punching and Shearing	H & R SPECIAL CARBON Water Hardening	C .90-1.05 or as specified, Mn .25, Si .20	Water, Brine Mach. 100 Movement + C
Punching and Shearing	H & R VANADIUM. Water Hardening	C 1.05-1.15, Mn .25, V .18, Si .20	Water, Brine Mach. 100 Movement + C
Punching and Shearing	(See H & R OIL HARDENING, H & R TUNGSTEN OIL HARDENING, H & R No. 19, H & R No. 60, H & R No. 225, Listed Above)		
Shock Resisting (Intermittent Impact)	H & R No. 15 Oil Hardening	C .45, Mn .55, Cr .95, V .20	Oil Mach. 80 Movement + B
Shock Resisting (Intermittent Impact)	H & R No. 85 Oil Hardening	C .50, Mn .80, Cr .95, V .20, Si .25	Oil Mach. 75 Movement —B
Shock Resisting (Repeated, Intermittent Impact)	(See MYA, H & R No. 60, Listed Above)		
Shock Resisting (Repeated Impact)	H & R SILICO Water, Oil Hardening	C .50, Mn .45, Mo .50, V .20, Si 1.10	Water, Oil Mach. 65 Movement + B
HOYLAND STEEL CO. INC., 405 Lexington Ave., New York 17, N. Y.			**Listing No. 28**
Cold Work Dies	HSC COLD HEADER DIE STEEL. Water Hardening	(Secure special information from manufacturer)	
Cold Work Dies	HSC-CVM Air Hardening	C .95-1.05, Mn .60-.80, Cr 5.00-5.50, Mo .95-1.25, V .20-.30, Si .20-.40	Air
Cold Work Dies	HSC-CW-OIL Oil Hardening	C .85-.95, Mn 1.00-1.20, Cr .40-.60, W .40-.60, Si .25-.45	Oil
Cold Work Dies	HSC SPECIAL Water Hardening	C 1.00-1.20, Mn .25-.35, Si .20-.30	Water
Cold Work Dies	HSC-SS-EXTRA Water Hardening	C 1.00-1.10, Mn .25-.35, Si .25-.35	Water
Cold Work Dies	HSC-350 Water Hardening	C 1.25-1.35, Mn .20-.40, W 3.00-4.00, Si .45	Water
Cold Work Dies (Blanking)	HSC-265 Oil, Air Hardening	C 1.55-1.70, Mn .25-.35, Cr 11.50-12.50, Mo .70-.90, V .15-.25, Si .25-.35	Air, Oil
Cold Work Tools	HSC REGULAR Water Hardening	C as specified, Mn .20-.35, Si .25-.35	Water
Cold Work Tools	HSC-VANCRO Water, Oil Hardening	C .45, Mn .70, Cr 1.00, Si .25, Va .15	Water, Oil
Cutting Tools (Roughing)	HSC COBALT 5 Oil, Air Hardening	C .68-.75, Mn .10-.30, Cr 3.75-4.25, W 16.75-17.75, Mo .40-.60, V .95-1.15, Co 4.25-4.75, Si .25-.40	Oil, Air
Cutting Tools (Roughing)	HSC 6-6-2 Oil, Air Hardening	C .75-.85, Mn .20-.30, Cr 3.90-4.30, W 5.50-6.00, Mo 4.50-5.50, V 1.40-1.75, Si .20-.40	Oil, Air
Cutting Tools (Roughing)	HSC 18-4-1 Oil, Air Hardening	C .70-.75, Mn .10-.30, Cr 3.75-4.25, W 17.50-18.50, V .95-1.15, Si .25-.40	Oil, Air
Cutting Tools (Finishing)	(See HSC Special, HSC-SS-EXTRA, HSC-350, Listed Above)		
Die Casting Dies	HSC-33 Air Hardening	C .30-.35, Mn .30-.40, Cr 4.50-5.00, W 1.00-1.20, Mo 1.40-1.60, Si .80-1.00	Air
Hot Work Dies	HSC-310 Oil, Air Hardening	C .28-.33, Mn .20-.30, Cr 3.00-3.50, W 9.50-10.50, V .25-.50, Si .20-.40	Oil, Air
Hot Work Dies	HSC-313 Oil, Air Hardening	C .35-.40, Mn .20-.35, Cr 2.75-3.25, W 13.00-14.00, Si .20-.40	Oil, Air
Hot Work Dies	HSC-515 Air Hardening	C .35-.40, Mn .20-.35, Cr 4.80-5.30, W 4.80-5.30, Mo .15-.30, Si .80-1.10	Air
Hot Work Dies	HSC-33 (Listed Above)		
Hot Work Dies (Medium)	HSC-VANCRO (Listed Above)		
Plastic Molding Dies	REMA Water Hardening	C .05-.07, Mn .15-.20	
Plastic Molding Dies	REMALLOY Water, Oil Hardening	C .10, Mn .50, Cr .65, Ni 1.50, Si .40	
Shock Resisting (Repeated Impact)	HSC 280 Water Hardening	C .50-.55, Mn .60-.80, Mo .30-.40, Si 1.30-1.60	Water
Shock Resisting (Repeated Impact)	HSC 422 Water, Oil Hardening	C .45-.50, Mn .20-.50, Cr .85-1.05, W .90-1.20, Mo .15-.25, Si .15-.30	Water, Oil

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

JESSOP STEEL CO., 500 Green St., Washington, Pa. — Listing No. 29

Cold Heading	NEW PROCESS COLD HEADER Water Hardening	C 1.00, Mn .25, Si .18	Water Mach. 100 Movement B
Cold Work Dies (Lamination Dies, etc.)	C.N.S.-1 Air Hardening	C 1.50, Mn .30, Cr 12.00, Mo .75, V .25, Si .40	Air Mach. 85 Movement B
Cold Work Dies (Lamination Dies, etc.)	WINDSOR Air Hardening	C1.00, Mn .50, Cr 5.00, Mo 1.25, V .30, Si .25	Air Mach. 85 Movement B
Cold Work Dies (Lamination Dies, etc.)	C.N.S.-2 Oil Hardening	C 2.25, Mn .42, Cr 12.00, V .20, Si .45	Oil Mach. 75 Movement B
Cold Work Dies	LION Water Hardening	C .60/1.30, Mn .30, Si .25	Water Mach. 100 Movement B
Cold Work Dies	LION EXTRA Water Hardening	C .60/1.30, Mn .30, Si .25	Water Mach. 100 Movement B
Cold Work Dies	SPECIAL OIL HARDENING Oil Hardening	C .90, Mn 1.75, Cr .20, Si .35	Oil Mach. 100 Movement A
Cold Work Dies	TRUFORM Oil Hardening	C .90, Mn 1.20, Cr .50, W .50, Si .30	Oil Mach. 100 Movement A
Cold Work Dies	WASHINGTON Water Hardening	C .60/1.30, Mn .30, Si .25	Water Mach. 100 Movement B
Cutting Tools	MOGUL High Speed	C .78, Mn .25, Cr 3.80, W 1.50 Mo 8.70, V 1.15, Si .30	Oil Mach. 60 Movement B
Cutting Tools	MUSTANG High Speed	C .84, Mn .25, Cr 4.20, W 6.35, Mo 5.00, V 1.95, Si .25	Oil Mach. 60 Movement B
Cutting Tools	PURPLE LABEL High Speed	C .74, Mn .28, Cr 4.20, W 18.50, Mo .50 max., V 1.10, Co 5.00	Oil Mach. 60 Movement B
Cutting Tools	PURPLE LABEL EXTRA High Speed	C .78, Mn .28, Cr 4.20, W 18.50, Mo .75, V 1.95, Co 7.90	Oil Mach. 60 Movement B
Cutting Tools	KING COBALT High Speed	C .78, Mn .30, Cr 4.20, W 19.50, Mo .75, V 1.75, Co 11.50	Oil Mach. 60 Movement B
Cutting Tools	SUPREMUS High Speed	C .73, Mn .28, Cr 4.00, W 18.00, V 1.10	Oil Mach. 60 Movement B
Cutting Tools	SUPREMUS EXTRA High Speed	C .85, Mn .30, Cr 4.00, W 18.50, Mo .75, V 2.10	Oil Mach. 60 Movement B
Cutting Tools	RAPID FINISHING Water Hardening	C 1.35, Mn .35, Cr .75, W 3.75	Water Mach. 85 Movement B
Cutting Tools	(See C.N.S.-1, C.N.S.-2, Truform, Windsor, listed above.)		
Cutting Tools (Roughing, Finishing)	(See Lion, Lion Extra, Washington, Rapid Finish, listed above.)		
Die Casting Dies	DICA B Air Hardening	C .35, Mn .35, Cr 5.00, W 1.15, Mo 1.50, V .20, Si 1.00	Air Mach. 75 Movement B
Die Casting Dies	3-C SPECIAL Air Hardening	C 1.55, Mn .30, Cr 13.00, Mo 1.15, Co 3.25, Ni .40, V .50	Air Mach. 75 Movement B
Gages	(See Truform, Special Oil Hardening, listed above.)		
Hot Work Tools & Dies	J HOT WORK Air Hardening	C .62, Mn .30, Si .35, Cr 3.80, Mo .55, V .55	Air Mach. 75 Movement B
Hot Work Tools & Dies	JJ HOT WORK Air Hardening	C .92, Mn .30, Si .35, Cr 3.80, Mo .55, V .55	Air Mach. 75 Movement B
Hot Work Tools & Dies	2B-HC Oil Hardening	C .47, Mn .30, Si .30, Cr 2.75, W 11.25, V .30	Oil, Air Mach. 75 Movement B
Hot Work Tools & Dies	2B-LC Oil Hardening	C .30, Mn .30, Si .30, Cr 3.00, W 10.00, V .30	Oil, Air Mach. 75 Movement B
Hot Work Tools & Dies	2B-MC Oil Hardening	C .37, Mn .30, Si .30, Cr 3.00, W 13.50, V .30	Oil, Air Mach. 75 Movement B
Shear Blades, Chisels, Dies, Forming Tools, Punches	RTS Water Hardening	C .55, Mn .50, Mo .45, Si .80	Water, Oil Mach. 90 Movement B
Shock Resisting Tools, Chisels	MAGIC Oil Hardening	C .52, Mn .90, Mo 1.00, Si 2.00	Water, Oil Mach. 75 Movement B
Shock Resisting Tools, (Pneumatic Tools) Shear Blades	TOP NOTCH Oil Hardening	C .50, Mn .30, Cr 1.15, W 2.40, V .20	Oil Mach. 80 Movement B
Tools & Dies (Shallow Hardening)	(See New Process Cold Header, Washington, listed above.)		

KENNAMETAL INC., Latrobe, Pa. — Listing No. 30

Cutting Tools (Heavy rough turning, forged, rolled steel) — KENNAMETAL KM, Carbide

Cutting Tools (Moderate finishing cuts, steel) — KENNAMETAL K3H, Carbide

Cutting Tools (Abrasive cuts on steel, large nose radius, or tools that dwell) — KENNAMETAL K4H, Carbide

Cutting Tools (Heavy roughing, cast steel, scaly, sandy cast iron) — KENNAMETAL K2S, Carbide

Cutting Tools (Hard steels, precision boring) — KENNAMETAL K5H, Carbide

Cutting Tools (Heavy roughing or planing of cast iron) — KENNAMETAL K1, Carbide

Cutting Tools (General machining, cast iron, nonmetallics) — KENNAMETAL K6, Carbide

Cutting Tools (Fine finishing cuts, precision boring on cast iron) — KENNAMETAL K8, Carbide

Dies, Cold Draw, Non-Galling (Wire, Sheet, Tube Drawing) — KENNAMETAL K86, Carbide

Dies, Cold Draw Medium, Non-Galling (Bar, Sheet, Tube Drawing) — KENNAMETAL K84, Carbide

Dies, Cold Draw Large, Non-Galling (Bar, Sheet, Tube Drawing) — KENNAMETAL K82, Carbide

Dies, Wear Resistant, No Shock — KENNAMETAL K96, Carbide

Dies, Wear Resistant, Light Shock (Light Blanking, Light Heading Hammers) — KENNAMETAL K95, Carbide

Dies, Cold Work, Light Shock (Blanking, Rivet Heading, Light Swaging) — KENNAMETAL K94, Carbide

Dies, Cold Work, Medium Shock (Lamination Punches & Dies, Heavy Forming Dies, Heavy Heading Hammers) — KENNAMETAL K92, Carbide

Dies, Cold Work, Medium To Heavy Shock (Crushing Hammers, Rivet Sets) — KENNAMETAL K91, Carbide

Dies, Cold Work, Heavy Shock (Heavy Blanking, Cold-Heading, Nibbling Dies) — KENNAMETAL K90, Carbide

Heat Resistant Applications—"KENTANIUM" (Titanium carbide) (Available in several different compositions for such uses as: Hot machining, flash trimming, hot spinning, hot die applications, etc.)

Rock Cutting Tools — KENNAMETAL K12, Carbide

Wear Resistant Parts (Adaptable to long slender extruded shapes) — KENNAMETAL KE7, Carbide

KLOSTER STEEL CORP., 224-228 N. Justine St., Chicago 7, Ill. — Listing No. 31

Cold Work Dies	PURE-ORE AIR-CHROM Air Hardening	C 1.00, Mn .57, Cr 5.30, Mo 1.0, V .26, Si .23	Air
Cold Work Dies	PURE-ORE EN-97	C .58, Mn .40, Cr .80-.90, Mo .42, Si .28, Ni 3.25	Oil

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium* % Machinability Annealed Movement in Hardening.
Cold Work Dies	PURE-ORE EXTRA Water Hardening	Carbon as desired	Water
Cold Work Dies	PURE-ORE ROLMO	C 1.00, Mn .29-.35, Cr 1.15-1.25, Mo .35-.40, Si .36	Oil
Cold Work Dies	PURE-ORE SPECIAL Water Hardening	Carbon as desired	Water
Cold Work Dies	PURE-ORE STANDARD Water Hardening	Carbon as desired	Water
Cold Work Dies	PURE-ORE No. 14	C 1.00, Mn .35, Cr .45, Si .23	Water
Cold Work Dies	PURE-ORE No. 25	C 1.20, Mn .35, Cr .60-.80, W 1.30, V .15-.25, Si .30	Water
Cold Work Dies (Blanking, Forming)	PURE-ORE HI-RUN Hi-Chrome, Hi-Carbon	C 1.50-1.60, Mn .35, Cr 11.50-12.50, Mo .75-.90, V .25-.35, Si .40-.50	Air
Cold Work Dies	KLOSTER SWED-OIL Oil Hardening	C .95-1.00, Mn 1.10-1.20, Cr .45-.50, W .45-.50, V .20, Si .25-.35	Oil
Cutting Tools	PURE-ORE CLIPPER High Speed	C .55-.75, Mn .15-.35, Cr 3.80-4.25, W 17.75-18.50, V .90-1.25, Si .20-.35	Oil
Cutting Tools	PURE-ORE COBALT High Speed	C .72-.80, Mn .25-.30, Cr 4.00-4.50, W 13.75-14.75, Mo .40-.60, V 2.00-2.50, Co 4.75-5.25, Si .20-.30	Oil
Cutting Tools	PURE-ORE FINISHING	C 1.30, Mn .35, W 3.50, Si .35-.45	Water
Cutting Tools	PURE-ORE PRIOR High Speed	C .78-.84, Mn .25-.35, Cr 4.00-4.50, W 18-19, Mo .50-.80, V 2.00-2.25, Si .20-.50	Oil
Hot Work Dies	PURE-ORE D-C-33 Hot Work	C .33, Mn .20-.40, Cr 4.50-5.50, W 1.35-1.75, Mo 1.45-1.85, Si .85-1.25	Air
Hot Work Dies	PURE-ORE D-C-66 Hot Work	C .30, Mn .31-.43, Cr 3.50, W 8.50-9.00, V .27, Si .29-.36	Air
Hot Work Dies	PURE-ORE KLS-44 Hot Work	C .57, Mn .51, Cr 1.01, Mo .92, Si .28, Ni 1.43	Oil, Air
Shock Resisting	PURE-ORE CHIZ-ALLOY	C .45, Mn .30, Cr 1.00-1.25, W 2.50, Si .90, V .20-.25	Oil
Shock Resisting	PURE-ORE SUPER ALLOY	C .45-.50, Mn .35, Cr 1.25, W 2.25-2.50, V .20-.25, Si .90-1.00	Oil

LATROBE ELECTRIC STEEL CO., Latrobe, Pa. — Listing No. 32

Cold Work Dies (Blanking)	COBALT CHROME Air Hardening	C 1.50, Mn .25, Cr 12.50, Mo .65, Co 3.15, Si .50	Air, Oil Mach. 60 Movement +A
Cold Work Dies (Blanking)	OLYMPIC Air Hardening	C 1.50, Mn .30, Cr 12.00, Mo .75, V 1.00, Si .30	Air, Oil Mach. 60 Movement +A
Cold Work Dies (Cold Forming)	CARBON COLD HEADER Water Hardening	C .93, Mn .25, Cr .10 Max., V .20, Si .20	Water Mach. 100 Movement —B
Cold Work Dies (Cold Forming)	CARBON COLD HEADER NO-V Water Hardening	C .93, Mn .25, Cr .10 Max., Si .20	Water Mach. 100 Movement —B
Cold Work Dies (Cold Forming)	CARBON COLD HEADER + Mo Water Hardening	C .93, Mn .25, Cr .10 Max., Mo .30, Si .20	Water Mach. 100 Movement —B
Cold Work Dies (Cold Forming)	C. F. S. Water Hardening	C 1.00, Mn .25, Si .20, Cr .50	Water Mach. 100 Movement —B
Cold Work Dies (Cold Forming)	EXTRA CARBON Water Hardening	C 1.01, Mn .25, Si .23	Water Mach. 100 Movement —B
Cold Work Dies (Cold, Hot Forming)	ELECTRITE No. 7 Oil Hardening	C .68, Mn .25, Cr 4.15, W 6.40, Mo 5.00, V 1.90, Si .30	Oil Mach. 60 Movement +A
Cold Work Dies (Cold, Hot Forming)	ELECTRITE No. 5 Oil Hardening	C .58, Mn .25, Cr 4.10, W 18.00, V 1.13, Si .25	Oil Mach. 55 Movement +A
Cold Work Dies (Cold Forming)	M CHROME Water Hardening	C 1.00, Mn .35, Cr 1.45, Si .25	Oil, Water Mach. 90 Movement —A
Cold Work Dies (Cold Forming)	RENOWN Water Hardening	C 1.00, Mn .25, V .20, Si .20	Water Mach. 100 Movement —B
Cold Work Dies (Cold Forming)	SPECIAL CARBON Water Hardening	C 1.01, Mn .25, Si .23	Water Mach. 100 Movement —B
Cold Work Dies (Cold Forming)	STAMINAL Oil Hardening	C .55, Mn .90, Cr .40, Mo .45, V .13, Si 1.00, Ni 2.70	Oil, Air Mach. 45 Movement +A
Cold Work Dies (Cold Forming)	STANDARD CARBON Water Hardening	C 1.01, Mn .25, Si .23	Water Mach. 100 Movement —B
Cold Work Dies (Cold Forming)	WOLVA Water Hardening	C .80, Mn .35, Cr .15, W .85, Si .25	Water Mach. 95 Movement —A
Cold Work Dies (Blanking, Forming)	BADGER Oil Hardening	C .94, Mn 1.20, Cr .50, W .50, Si .30	Oil Mach. 90 Movement +A
Cold Work Dies (Blanking, Cold Forming)	G. S. N. Oil Hardening	C 2.20, Mn .50, Cr 13.40, Si .50	Oil Mach. 45 Movement +A
Cold Work Dies (Blanking, Forming)	MANGANO Oil Hardening	C .95, Mn 1.60, Cr .20, Si .35	Oil Mach. 90 Movement +A
Cold Work Dies (Blanking, Forming)	M. G. R. Air Hardening	C .55, Mn .30, Cr 5.00, W 1.20, Mo 1.20, Si .95	Air, Oil Mach. 85 Movement +A
Cold Work Dies (Blanking, Cold Forming)	SELECT B Air Hardening	C 1.00, Mn .70, Cr 5.25, Mo 1.10, V .30, Si .30	Air, Oil Mach. 70 Movement +A
Cold Work Dies, Wear Parts (Blanking, Cold Forming)	BR-4 Air Hardening	C 2.40, Si .25, Mn .25, Cr 13.00, V 4.00, Mo 1.00	Air, Oil Mach. 40 Movement +A
Cutting Tools (Finishing)	ELECTRITE DOUBLE SIX M-2 Oil Hardening, High Speed	C .84, Mn .25, Cr 4.15, W 6.40, Mo 5.00, V 1.90, Si .30	Oil Mach. 55 Movement +A
Cutting Tools (Finishing)	ELECTRITE MHV-6 Oil Hardening High Speed	C 1.03, Si .25, W 6.00, Cr 4.00, Mo 6.00 Mn .25, V 2.40	Oil Mach. 50 Movement +A
Cutting Tools (Finishing)	ELECTRITE MV 1 Oil Hardening, High Speed	C .80, Mn .30, Cr 4.10, Mo 4.25, V 1.10, Si .25	Oil Mach. 60 Movement +A
Cutting Tools (Finishing)	ELECTRITE MV 2 Oil Hardening, High Speed	C .88, Mn .30, Cr 4.10, Mo 4.25, V 1.82, Si .25	Oil Mach. 55 Movement +A
Cutting Tools (Finishing)	ELECTRITE MV 3 Oil Hardening, High Speed	C 1.18, Mn .30, Cr 4.10, Mo 4.25, V 3.15, Si .25	Oil Mach. 50 Movement +A

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Finishing)	ELECTRITE MV 4 Oil Hardening, High Speed	C 1.40, Mn .30, Cr 4.10, Mo 4.25, V 4.15, Si .25	Oil Mach. 45 Movement +A
Cutting Tools (Finishing)	ELECTRITE HV-6 Oil Hardening, High Speed	C 1.15, Mn .25, Cr 4.10, W 6.00, Mo 6.00, V 3.00, Si .25	Oil Mach. 50 Movement +A
Cutting Tools (Finishing)	ELECTRITE TATMO Oil Hardening, High Speed	C .80, Mn .25, Cr 4.00, W 1.70, Mo 8.75, V 1.15, Si .25	Oil Mach. 55 Movement +A
Cutting Tools (Finishing)	ELECTRITE T.N.W. Oil Hardening, High Speed	C .87, Mn .25, Cr 4.00, Mo 8.00, V 1.90, Si .25	Oil Mach. 55 Movement +A
Cutting Tools (Finishing)	ELECTRITE U Oil Hardening, High Speed	C .71, Mn .25, Cr 4.10, W 14.25, Mo .75, V 1.95, Si .25	Oil Mach. 55 Movement +A
Cutting Tools (Finishing)	ELECTRITE VANADIUM Oil Hardening, High Speed	C 1.08, Mn .25, Cr 4.10, W 18.50, Mo .85, V 3.10, Si .25	Oil Mach. 50 Movement +A
Cutting Tools (Finishing)	E. S. A. Water Hardening	C 1.40, Mn .25, Cr .50, W 4.00, V .30, Si .20	Water Mach. 65 Movement —B
Cutting Tools (Finishing)	W. T. Water Hardening	C 1.25, Mn .25, Cr .45, W 1.40, Mo .25, V .35, Si .30	Oil, Water Mach. 85 Movement +A
Cutting Tools (Finishing)	ELECTRITE #1 Oil Hardening, High Speed	C .75, Mn .25, Cr 4.10, W 18.00, V 1.13, Si .25	Oil Mach. 55 Movement +A
Cutting Tools (Finishing)	ELECTRITE #19 Oil Hardening, High Speed	C .85, Mn .25, Cr 4.10, W 18.50, Mo .60, V 2.20, Si .25	Oil Mach. 50 Movement +A
Cutting Tools (Roughing)	ELECTRITE COBALT Oil Hardening, High Speed	C .73, Mn .25, Cr 4.10, W 18.50, Mo .65, V 1.10, Co 5.00, Si .25	Oil Mach. 50 Movement +A
Cutting Tools (Roughing)	ELECTRITE CO-6 Oil Hardening, High Speed	C .88, Mn .25, Cr 4.10, W 6.00, Mo 5.25, V 1.90, Co 9.00, Si .30	Oil Mach. 45 Movement +A
Cutting Tools (Roughing)	ELECTRITE LACOMO Oil Hardening, High Speed	C .81, Mn .30, Cr 4.10, W 1.70, Mo 8.30, V 1.25, Co 5.00, Si .30	Oil Mach. 50 Movement +A
Cutting Tools (Roughing)	ELECTRITE SUPER COBALT Oil Hardening, High Speed	C .85, Mn .25, Cr 4.20, W 18.80, Mo .80, V 1.90, Co 9.10, Si .30	Oil Mach. 45 Movement +A
Cutting Tools (Roughing)	ELECTRITE ULTRA COBALT Oil Hardening, High Speed	C .85, Mn .25, Cr 4.20, W 18.90, Mo .80, V 1.90, Co 12.00, Si .25	Oil Mach. 40 Movement +A
Cutting Tools (Roughing)	ELECTRITE UB Oil Hardening, High Speed	C .78, Mn .30, Cr 3.90, W 13.50, Mo .50, V 2.00, Co 4.75, Si .25	Oil Mach. 50 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE UB-4 Oil Hardening, High Speed	C 1.50, Si .25, Mn .25, W 13.50, Cr 4.50, V 5.00, Co 5.00, Mo .50	Oil Mach. 40 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE UB-4M Oil Hardening, High Speed	C 1.50, Si .25, Mn .25, W 6.50, Cr 4.00 V 5.00, Co 5.00	Oil Mach. 40 Movement +A
Die Casting Dies	ALDIVAN Oil Hardening	C .45, Mn .65, Cr 2.50, V .25, Si .25	Oil Mach. 90 Movement +A
Die Casting Dies	DYCAST NO. 1 Air Hardening	C .40, Mn .30, Cr 5.40, Mo .90, V .50, Si 1.00	Air Mach. 65 Movement +A
Die Casting Dies	LUMDIE Air Hardening	C .40, Mn .25, Cr 5.25, W. 4.65, Si 1.00	Air Mach. 65 Movement +A
Die Casting Dies	V.D.C. Air Hardening	C .40, Mn .30, Cr 5.40, Mo 1.20, V 1.00, Si 1.00	Air Mach. 70 Movement +A
Die Casting Dies	Z.T.M. Oil Hardening	C .35, Mn .80, Cr .85, Mo .30, Si .55	Oil Mach. 90 Movement +A
Hot Work Dies (Hot Forming)	C.L.W. Oil Hardening	C .30, Mn .25, Cr 3.30, W 9.15, V .50, Si .45	Oil Mach. 70 Movement +B
Hot Work Dies (Hot Forming)	E.H.W. NO. 1 Oil Hardening	C .25, Mn .25, Cr 4.10, W 15.10, V .50, Si .25	Oil Mach. 65 Movement +B
Hot Work Dies (Hot Forming)	KALKOS Oil Hardening	C .30, Mn .35, Cr 12.00, W 12.00, V .90, Si .50	Air, Oil Mach. 50 Movement +B
Hot Work Dies (Hot Forming)	L.P.D. Air Hardening	C .35, Mn .30, Cr 5.00, W 1.35, Mo 1.65, Si 1.00	Air, Oil Mach. 70 Movement +A
Hot Work Dies (Hot Forming)	MCL Oil Hardening	C .30, Si .40, W 1.00, Mo 6.25, Cr 3.75, V .75	Oil Mach. 75 Movement +B
Hot Work Dies (Hot Forming)	SELECT M Air Hardening	C .93, Mn .35, Cr 3.50, Mo .60, V .20, Si .25	Oil Mach. 75 Movement +B
Hot Work Dies (Hot Punching, Hot Shearing)	C.H.W. Oil Hardening	C .50, Mn .30, Cr 2.80, W 15.10, V .50, Si .25	Oil Mach. 60 Movement +B
Hot Work Dies (Hot Punching, Hot Shearing)	MCH Oil Hardening	C .50, Si .50, W 1.00, Mo 6.25, Cr 3.75, V .75	Oil Mach. 65 Movement +B
Permanent Magnets	37% COBALT MAGNET Oil Hardening	C .90, Mn .30, Cr 4.25, W 2.25, Co 38.00, Si .25	Oil Mach. 30 Movement +A
Plastic Molding Dies (Machine Cut Cavity Dies)	CASCADE Oil Hardening	C .13, Mn .25, Cr .12, Si .25, Ni 4.00, Al 1.60	Oil Mach. 90 Movement +A
Shock Resisting (Intermittent Impact)	CROWN Oil Hardening	C .50, Mn .80, Cr .95, V .20, Si .25	Oil Mach. 75 Movement —B
Shock Resisting (Intermittent Impact)	SUPERB Oil Hardening	C .75, Mn .25, Cr .95, V .18, Si .20	Water, Oil Mach. 90 Movement +A
Shock Resisting (Repeated Impact)	N. D. S. Oil Hardening	C .75, Mn .30, Cr 1.00, Si .25, Ni 1.70	Oil Mach. 60 Movement +A
Shock Resisting (Repeated Impact)	X.L. CHISEL Oil Hardening	C .55, Mn .25, Cr 1.35, W 2.00, V .25, Si .25	Oil Mach. 85 Movement +B
Thermostat Parts	INVAR	C .13, Mn .80, Si .25, Ni 38.00	... Mach. 40 Movement O

P. F. McDONALD & CO., 17 King Terminal, Boston 27, Mass. — Listing No. 33

Cold Work Dies (Blanking, Punching, Cold Forming)	MACCO KROMAX 1 Air Hardening	C 1.50, Mn .35, Cr 11.90, Mo .90, V .28, Si .23	Air, Oil Mach. 60 Movement A
Cold Work Dies (Blanking, Punching, Cold Forming)	MACCO KROMAX 2 Air Hardening	C 1.40, Mn .32, Cr 12.50, Mo .85, Co 3.25, Si .42	Air Mach. 60 Movement A
Cold Work Dies (Cold Heading)	MACCO B-29 Water Hardening	C .98, Mn .26, V .20, Si .20	Water Mach. 70 Movement B
Cold Work Punches, Dies (all kinds)	MACCO 35 AIR HARD	C 1.00, Mn .60, Cr 5.25, Mo 1.15, V .25, Si .25	Air Mach. 65 Movement A
Cold Work Punches, Dies (all kinds)	MACCO ROYAL CROWN Oil Hardening	C .90, Mn 1.20, Cr .50, W .50, V .25, Si .30	Oil Mach. 70 Movement A
Cold Work Punches, Dies (all kinds)	MACCO SPECIAL Water Hardening	C 1.01, Mn .20, Si .16	Water Mach. 70 Movement B
Cutting Tools	MACCO ENORMOUS High Speed	C .83, Mn .25, Cr 4.50, W 22.00, Mo 1.00, V 2.00, Co 10.00, Si .27	Oil Mach. 60 Movement B

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium ★ % Machinability Annealed Movement in Hardening
Cutting Tools	MACCO RADIO High Speed	C .84, Mn .25, Cr 4.00, W 6.50, Mo 5.00, V 1.90, Si .26	Oil Mach. 65 Movement A
Cutting Tools	MACCO SUPERIOR High Speed	C .75, Mn .28, Cr 4.00, W 18.00, V 1.00, Si .22	Oil Mach. 60 Movement A
Cutting Tools	MACCO SUPER MOLY High Speed	C .80, Mn .25, Cr 3.90, W 1.70, Mo 8.80, V 1.10, Si .24	Oil Mach. 65 Movement B
Die Casting Lens Molds	MACCO LENS MOULD High Speed	C .40, Mn .25, Cr 5.25, W 4.65, Si 1.00	Air, Oil Mach. 70 Movement A
Die Casting (Magnesium, Aluminum)	MACCO 33 Air Hardening	C .40, Mn .30, Cr 5.50, Mo 1.40, V 1.00, Si 1.00	Air Mach. 70 Movement A
Die Casting (Zinc)	MACCO 99 Oil Hardening	C .35, Mn .80, Cr .85, Mo .35, Si .60	Oil Mach. 70 Movement B
Hot Work Dies	MACCO M L Air Hardening	C .35, Mn .30, Cr 5.00, W 1.50, Mo 1.65, Si 1.00	Air Mach. 70 Movement A
Hot Work Dies	MACCO P-125 High Speed	C .25, Mn .28, Cr 4.20, W 15.50, V .50, Si .27	Oil Mach. 65 Movement A
Hot Work Dies	MACCO P-150 High Speed	C .51, Mn .29, Cr 2.90, W 15.30, V .60, Si .25	Oil Mach. 65 Movement A
Hot Work Dies	MACCO P-175 High Speed	C .31, Mn .29, Cr 3.30, W 9.50, V .50, Si .43	Oil Mach. 65 Movement A
Impact Tools, Chisels, Shear Blades	MACCO FOOLPROOF	C .55, Mn .25, Cr 1.40, W 2.40, V .30, Si .25	Oil Mach. 75 Movement B
Plastic Molding Dies (Hubs)	MACCO HARD TUF Oil Hardening	C .50, Mn .30, Cr 1.60, W 2.60, V .25, Si .60	Oil Mach. 75 Movement B
Plastic Molding Dies (Hubs)	MACCO HOBOMOLD Water, Oil Hardening	C .04, Mn .20, Si .16	Oil, Water Mach. 100 Movement B
Plastic Molding Dies (Machined)	MACCO N L S Air Hardening	C .90, Mn .60, Cr 5.20, Mo 1.20, V .30, Si .25	Air Mach. 70 Movement A
Punching, Shearing	MACCO FOOL PROOF Oil Hardening	C .55, Mn .25, Cr 1.40, W 2.40, V .30, Si .25	Oil Mach. 75 Movement B
Shock Resisting (Intermittent Impact, Chisels)	MACCO SIL. MANG. Oil Hardening	C .63, Mn .78, Si 2.00	Oil Mach. 75 Movement B
Shock Resisting (Repeated Impact, Chisels)	MACCO FOOL PROOF	(Listed Above)	
Tools, Dies, Sleeves	MACCO HOLLOW BAR TUBING	C 1.05, Mn .30, Cr 1.05	Oil Mach. 70 Movement A

McINNES STEEL CO., 441 E. Main St., Corry, Pa. — Listing No. 34

"Brake Dies"	McINNES FOLDER-DIE	(Special steel "Brake Die", furnished heat treated, ready for use.)	
Cold Work Dies	HI-CAR-HI. CH. Oil, Air Hardening	C 2.15, Cr 13.00, V 1.00, Ni .50	Oil, Air
Cold Work Dies	M-10-AIR HARD Oil, Air Hardening	C 1.00, Mn .70, Cr 5.00, Mo 1.05	Air
Cold Work Dies	CELLO Oil Hardening	C .90, Mn 1.20, Cr .50, W .50, Si .35	Oil
Cold Work Dies	VAN. CRUC. Water Hardening	C 1.00, Mn .30, V .21, Si .30	Water
Cutting Tools	DURO HI SP Oil Hardening	C .80, Cr 4.00, W 18.50, Mo 4.00, Co 7.00	Oil
Cutting Tools	MOLY HI SP Oil Hardening	C .80, Cr 4.00, W 5.50, Mo 4.25, V 1.50	Oil
Cutting Tools	"V" HI. SP. Oil Hardening	C .75, Cr 4.00, W 18.50, V 1.10	Oil
Dies and Tools	McINNES SPECIAL Water Hardening	C 1.00, Mn .25	Water
Dies and Tools	SUPERIOR Water Hardening	C .95, Mn .40, Si .30	Water
General Tool Steel	MISCO A Water Hardening	C .90, Mn .40	Water
General Tool Steel	MISCO B Water Hardening	C .80, Mn .40	Water
Hot Work Dies	RECORD "A" Oil Hardening	C .50, Cr 3.75, W 14.00, V .75	Oil
Hot Work Dies	SPECIAL CHR. NICK. Oil Hardening	C .70, Mn .70, Cr .55, Ni 1.50	Oil

METAL CARBIDES CORP., 107 E. Indianola Ave., Youngstown 7, O. — Listing No. 35

Cold Work Dies (Blanking)	TALIDE C-7525, Carbide	C 6.0, W 69.0, Co 25.0
Cold Work Dies (Cold Forming)	TALIDE C-88, Carbide	C 6.0, W 82.0, Co 12.0
Cutting Tools (Finishing)	TALIDE C-91, Carbide	C 6.0, W 86.0, Co 8.0
Cutting Tools (Finishing)	TALIDE C-93, Carbide	C 6.0, W 88.0, Co 6.0
Cutting Tools (Finishing)	TALIDE S-90, Carbide	C 6.0, W 86.0, Co 8.0 (Also contains titanium carbide)
Cutting Tools (Finishing)	TALIDE S-92, Carbide	C 6.0, W 88.0, Co 6.0 (Also contains titanium carbide)
Cutting Tools (Roughing)	TALIDE C-89, Carbide	C 6.0, W 84.0, Co 10.0
Cutting Tools (Roughing)	TALIDE S-88, Carbide	C 6.0, W 84.0, Co 10.0 (Also contains titanium carbide)
Punching, Shearing	TALIDE C-8020, Carbide	C 6.0, W 74.0, Co 20.0
Shock Resisting (Intermittent Impact)	TALIDE C-8515, Carbide	C 6.0, W 79.0, Co 15.0
Shock Resisting (Repeated Impact)	TALIDE C-8020, Carbide	C 6.0, W 74.0, Co 20.0

A. MILNE & CO., 745 Washington St., New York 14, N. Y. — Listing No. 36

Cold Drawing Dies	GRAPH-TUNG§ Water Hardening	C 1.50, Mn .40 Max. W 2.80 Avg., Mo .50, Si .60-.70	Water Mach. 100 Movement C
Cold Drawing Dies	GRAPH-MO§ Oil Hardening	C 1.50, Mn 1.00 Max, Mo .25 Avg., Si .80 Avg.	Oil Mach. 160 Movement A
Cold Drawing Dies	HIGH PRODUCTION Air Hardening	C 1.55, Cr 11.50, Mo .75, V 1.00	Air, Oil Mach. 60 Movement A
Cold Heading Dies (Also Nonferrous Cold Drawing Dies)	GRAPH-AL§ Water Hardening	C 1.50, Mn .30 Max, Si .15-.25, Ni Al .12-.20	Water Mach. 160 Movement C

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking, Forming)	AMC — Oil, Air Hardening, High Speed	Cr 4.00, W 18.00, V 1.00	Oil, Hot Salt, Air Mach. Movement A 55
Cold Work Dies (Blanking, Forming)	AMCOH — Standard Oil Hardening	C .95, Mn 1.25, Cr .50, W .50	Oil Mach. 80 Movement A
Cold Work Dies (Blanking, Forming)	DOUBLE SEVEN — Air Hardening	C 1.35, Cr 12.50, Mo .60, Co 3.00	Air, Oil Mach. 45 Movement A
Cold Work Dies (Blanking, Forming)	DOUBLE SIX — Air Hardening	C 2.25, Cr 13.00	Oil, Air Mach. 45 Movement A
Cold Work Dies (Blanking, Forming)	ORANGE LABEL — Water Hardening	C 1.00-1.10	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Forming)	(See GRAPH-TUNG, GRAPH-MO, HIGH PRODUCTION, Listed Above)		
Cutting Tools (Finishing)	AMC (Listed Above)		
Cutting Tools (Finishing)	MILVAN — Oil, Air Hardening, High Speed	Cr 4.25, W 19.00, V 2.25	Oil, Hot Salt, Air Mach. Movement A 55
Cutting Tools (Finishing)	MM6&6 — Oil, Air Hardening, High Speed	C .85, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil, Hot Salt Mach. 60 Movement A
Cutting Tools (Roughing)	HYCO — Oil, Air Hardening, High Speed	Cr 4.25, W 18.50, V 1.30, Co 5.00	Oil, Hot Salt, Air Mach. Movement A 50
Cutting Tools (Roughing)	MAJOR — Oil, Air Hardening, High Speed	Cr 4.00-5.00, W 21.00-22.00, Mo .50, V 1.50, Co 13.00	Oil, Hot Salt, Air Mach. Movement A 45
Cutting Tools (Roughing)	(See AMC, MILVAN, MM6&6, Listed Above)		
Die Casting Dies	AO20 — Water, Oil Hardening	C .50, Cr 1.50, W 2.25, V .25	Oil, Water Mach. 70 Movement B
Die Casting Dies	CMW — Air Hardening	C .35, Cr 5.00, W 1.30, Mo 1.75, Si 1.00	Oil, Air Mach. 80 Movement A
Gages	(See AMCOH, GRAPH-MO, GRAPH-TUNG, HIGH PRODUCTION, Listed Above)		
High Stress, High Wear, Machinery Parts	(See GRAPH-MO, GRAPH-TUNG, MSM, Listed Above)		
Hot Work Dies (Hot Forming)	(See AMC, AO20, CMW, Listed Above)		
Hot Work Dies (Hot Forming)	3074 HOT WORK — Oil, Air Hardening	C .35, Cr 4.00, W 8.00-10.00, V .50	Oil, Air Mach. 55 Movement A
Hot Work Dies (Hot Punching, Hot Shearing)	(See AMC, AO20, CMW, 3074 HOT WORK, Listed Above)		
Plastic Molding Dies (Ejector Pins)	MSM — Water, Oil Hardening	C .55, Mn .80, Mo .50, V .25, Si 2.00	Oil, Water Mach. 80 Movement B
Plastic Molding Dies (Ejector Pins)	AO20 (Listed Above)		
Plastic Molding Dies (Hubs)	(See AMCOH, AO20, GRAPH-MO, HIGH PRODUCTION, MSM, Listed Above)		
Plastic Molding Dies (Machine Cavities)	(See AMCOH, GRAPH-MO, Listed Above)		
Punching and Shearing	(See AMCOH, DOUBLE SEVEN, GRAPH-MO, HIGH PRODUCTION, MSM, ORANGE LABEL, Listed Above)		
Shock Resisting (Repeated, Intermittent Impact)	(See AO20, GRAPH-AL, GRAPH-TUNG, MSM, ORANGE LABEL, Listed Above)		

§ Made by Timken Roller Bearing Co.

PENINSULAR STEEL CO., 1030-40 McDougall Ave., Detroit 7, Mich. — Listing No. 37

Coining, Swaging Dies	BROWN LABEL — Oil Hardening	C .47.-.53, Mn .15-.25, Cr 1.10-1.30, W 2.25-2.75, V .15-.25, Si .65-.85	Oil Mach. 80 Movement +B
Cold Heading	GRAY LABEL — Water Hardening	C .91-.98	Water Mach. 100 Movement —C
Cold Work Dies (Forming)	GREEN LABEL — Oil Hardening	C .50-.55, Mn .70-.90, Cr .90-1.10, V .15-.25	Oil Mach. 100 Movement +B
Cold Work Dies (Blanking, Forming)	BLACK LABEL — Water Hardening	C 1.05-1.15, Cr .50-.60, V .15-.25	Water Mach. 95 Movement —C
Cold Work Dies (Blanking, Forming)	BLUE LABEL — Water Hardening	C 1.00-1.10, V .15-.25	Water Mach. 100 Movement —C
Cold Work Dies (Blanking, Forming, Coining, Punching, Rolling)	WHITE LABEL — Oil, Air Hardening	C 1.40-1.60, Cr 11.00-13.00, Mo .70-.90, V .30-.40	Air Mach. 75 Movement +A
Cold Work Dies (Forming, Rolling, Blanking)	YELLOW LABEL — Oil Hardening	C .85-.95, Mn 1.10-1.25, Cr .40-.60, W .40-.60, V .15-.25, Si .20-.40	Oil Mach. 85 Movement +B
Cold Work Dies (Forming, Draw Rings)	HOLLOBAR — Oil Hardening	C .95-1.05, Mn .30-.50, Cr 1.00-1.20, Mo .25-.30	Oil Mach. 85 Movement +B
Cold Work Dies (Blanking, Forming, etc.)	GRAPH-MO — Oil Hardening	C 1.50 Avg., Mn .50 Max., Mo .25 Avg., Si .80 Avg.	Oil Mach. 100 Movement A
Cold Work Dies (Bar, Tube Drawing, Draw Dies, Stainless)	GRAPH-TUNG — Water Hardening	C 1.50 Avg., Mn .50 Max., W 2.80 Avg., Mo .50 Avg., Si .65 Avg.	Water, Brine Mach. 85 Movement B
Cold Work Dies (Blanking, Cold Forming)	PEN AIR #5 — Air Hardening	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25	Air Mach. 65 Movement +A
Cold Work Dies (Press Brake Forming)	PENCO BRAKE DIE	C .51, Mn .87, Cr .95, Mo .20	Mach. 80
Cut Off Bushing	GRAPH-TUNG (Listed Above)		
Dies (Bars, Tube Drawing, etc.)	GRAPH-AL — Water Hardening	C 1.50 Avg., Mn .30 Max., Si .15-.25, Al .12-.20	Water, Brine Mach. 100 Movement B
Dies (Blanking, Cold Forming, etc.)	GRAPH M.N.S. — Air Hardening	C 1.50 Avg., Mn 1.25 Avg., Cr .50 Avg., Mo .50 Avg., Si 1.00 Avg.	Air Mach. 85 Movement A
Die Casting Dies	PENCO CR-MO-V — Air Hardening	C .33, Cr 5.25, Mo 1.15, V .45, Si 1.10	Oil, Air Mach. 70 Movement +A
Hobbed Cavities	PEN-HOB — Water, Oil Hardening	C .10 Max., Mn .50, Cr .60, Ni 1.25	Water, Oil Mach. 90 Movement B
Lathe Centers	GRAPH-TUNG (Listed Above)		
Master Gages, Hobs	WHITE LABEL (Listed Above)		
Plastic Mold Dies (Hubbed Cavity Dies)	PENCO ACS — Air Hardening	C .07, Mn .40, Si .25, Cr 4.50	Oil, Air Mach. 65 Movement +A
Plastic Mold Master Hobs	BROWN LABEL (Listed Above)		
Plastic Molds (Machined Cavities)	GREEN LABEL (Listed Above)		
Plastic Molds (Hubs)	YELLOW LABEL (Listed Above)		
Punches (Blanking, Forming, Piercing, etc.)	GRAPH-MO (Listed Above)		
Punching, Shearing	SILVER LABEL — Water, Oil Hardening	C .55-.60, Mn .65-.80, Mo .40-.50, V .16-.25, Si 1.70-2.00	Water, Oil Mach. 100 Movement +B
Punching, Shearing	(See BLACK LABEL, BLUE LABEL, Listed Above)		

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Shock Resisting	BROWN LABEL	(Listed Above)	
Shock Resisting (Tool Shanks)	SILVER LABEL	(Listed Above)	
Tool Shanks, Wrenches	GREEN LABEL	(Listed Above)	
Tube Drawing Mandrels	GRAPH-AL	(Listed Above)	

HORACE T. POTTS CO., Erie Avenue & D St., Philadelphia 34, Pa. — Listing No. 38

Die Casting Dies	"ELASTUF 44'	C .50, Bal. Cr, Ni, Mo, Fe	Commercially Machinable
High Stress, High Wear Machinery Parts	"ELASTUF TYPE A2"	C .30-.50, Bal. Cr, Ni, Mo, Fe	Commercially Machinable
High Stress, High Wear Machinery Parts	"ELASTUF 44"	C .50, Bal. Cr, Ni, Mo, Fe	Commercially Machinable
Plastic Molding Dies (Ejector Pins)	"ELASTUF 44"	C .50, Bal. Cr, Ni, Mo, Fe	Commercially Machinable
Punching and Shearing	TROJAN #8 (Unannealed) Water Hardening	C .75-.85, Mn .35-.50	Water Movement +B
Punching and Shearing	TROJAN #9½ (Annealed)	C .90-1.00, Mn .35-.50	Water Movement +B

RAVEN STEEL & TOOL CO. INC., 100 E. Hawthorne Ave., Valley Stream, N. Y. — Listing No. 39

Cold Work Dies (Cold Forming)	MYA Oil Hardening	C .60, Mn .80, Cr 1.20, V .15, Si .80	Oil
Cold Work Dies (Blanking, Cold Forming)	SPECIAL KR Oil, Air Hardening	C 2.15, Mn .30, Cr 12.00, Mo .80, V .20, Si .40	Oil
Cold Work Dies (Blanking, Cold Forming)	SPECIAL VERY HARD Water Hardening	C 1.45, Mn .30, Cr .30, W 3.30, V .25, Si .20	Water
Cold Work Dies (Blanking, Cold Forming)	EXTRA TOUGH & HARD Water Hardening	C 1.10, Mn .20, Si .20	Oil
Cold Work Dies (Blanking, Cold Forming)	SPECIAL K5 Air Hardening	C 1.00, Mn .70, Cr 5.30, Mo 1.00, V .15, Si .30	Air
Cold Work Dies (Blanking, Cold Forming)	SPECIAL KN Air Hardening	C 1.50, Mn .30, Cr 12.00, Si .40	Air
Cold Work Dies (Blanking, Cold Forming)	AMUTIT S Oil Hardening	C .95, Mn 1.00, Cr .50, W .50, V .10, Si .20	Oil
Cutting Tools (Finishing)	(See SPECIAL VERY HARD, Listed Above)		
Cutting Tools (Finishing)	EXTRA RAPID 300 Oil, Air Hardening	C 1.25, Mn .25, Cr 4.30, W 12.50, Mo .90, V 3.30, Si .20	Oil
Cutting Tools (Roughing)	SUPER RAPID EXTRA Oil, Air Hardening	C .75, Mn .25, Cr 4.30, W 18.00, V 1.10, Si .20	Oil
Cutting Tools (Roughing)	SUPER RAPID EXTRA 500 Oil, Air Hardening	C .85, Mn .25, Cr 4.30, W 18.00, Mo .90, V 1.90, Co 4.80, Si .20	Oil
Cutting Tools (Roughing)	CC Oil, Air Hardening	C .76, Mn .25, Cr 4.30, W 18.00, Mo .90, V 1.60, Co 9.50, Si .20	Oil
Cutting Tools (Roughing)	SUPER RAPID EXTRA MO Oil, Air Hardening	C .83, Mn .25, Cr 4.30, W 6.40, Mo 5.00, V 1.90, Si .20	Oil
Cutting Tools (Roughing)	MO-RAPID EXTRA 3 Oil, Air Hardening	C .96, Mn .25, Cr 4.30, W 2.90, Mo 2.70, V 2.40, Si .20	Oil
Die Casting Dies	US ULTRA Oil, Air Hardening	C .36, Mn .40, Cr 5.00, Mo 1.30, V .35, Si 1.10	Air
Die Casting Dies	WKZ Oil, Air Hardening	C .30, Mn .30, Cr 2.70, W 8.50, V .35, Si .30	Oil
Hot Work Dies (Hot Punching, Hot Shearing, Hot Forming)	(See US ULTRA, WKZ, SUPER RAPID EXTRA MO, SUPER RAPID EXTRA, Listed Above)		
Plastic Molding Dies (Hubs)	(See SPECIAL K5 Listed Above)		
Shock Resisting (Repeated Intermittent)	MYA Oil Hardening	C .60, Mn .80, Cr 1.20, V .15, Si .80	Oil
Shock Resisting (Repeated Intermittent)	MY EXTRA Oil Hardening	C .45, Mn .30, Cr 1.00, Si .90, W 1.90	Oil
Shock Resisting (Repeated Intermittent)	V 6 N Water Hardening	C .90, Mn .30, V .20, Si .20, Ni .70	Water
Shock Resisting (Repeated Intermittent)	NBS Air, Oil Hardening	C .52, Mn .30, Cr 1.10, Mo .70, Si .20, Ni 3.30	Oil, Air
Punching & Shearing	(See SPECIAL KN, SPECIAL K5, AMUTIT S, EXTRA TOUGH & HARD, SPECIAL KR, Listed Above)		

REPUBLIC STEEL CORP., 1970 Carter Rd., Cleveland 13, O. — Listing No. 40

Cold Work (Forming)	C-C Water Hardening	C 1.10, Mn .30, Cr .60	Water Mach. 85 Movement —B
Cold Work (Forming)	UA-8 Water Hardening	C 1.00, Mn .35, Cr 1.35, Mo .35	Water, Oil Mach. 80 Movement B
Cold Work (Hubs)	C-V Oil Hardening	C .50, Mn .30, Cr 1.20, W 2.20, V .25	Water, Oil Mach. 85 Movement +B
Cold Work (Punching, Shearing, Forming)	DUMOST #1 Water Hardening	C .85, Mn .30, V .30	Water Mach. 90 Movement —B
Cold Work (Punching, Shearing, Forming)	DUMOST #2 Water Hardening	C .95, Mn .30, V .30	Water Mach. 90 Movement —B
Cold Work (Punching, Shearing, Forming)	EXTRA CARBON Water Hardening	C .65-1.40, Mn .30, Si .15-.30	Water Mach. 100 Movement —B
Cold Work (Punching, Shearing, Forming)	SPECIAL CARBON Water Hardening	C .65-1.40, Mn .30, Si .15-.30	Water Mach.100 Movement —B
Cold Work (Punching, Shearing, Forming)	STANDARD CARBON Water Hardening	C .65-1.00, Mn .30, Si .15-.30	Water Mach. 100 Movement —B
Cold Work (Forming, Shearing)	UA-6 Oil Hardening	C .65, Mn .60, Cr 1.00, W .25	Oil, Water Mach. 75 Movement —B
Cold Work Dies (Blanking, Forming)	DUMOST #3 Water Hardening	C 1.10, Mn .30, V .30	Water Mach. 85 Movement —B

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking, Forming, Shearing)	AIRALOY Air Hardening	C 1.00, Mn 2.00, Cr .90, Mo .90	Air Mach. 65 Movement +A
Cold Work Dies (Blanking, Forming, Shearing)	ARRESTITE Oil Hardening	C .90, Mn 1.50, Cr .20	Oil Mach. 90 Movement A
Cold Work Dies (Blanking, Forming, Shearing)	KROMAIR	C 1.00, Cr 5.25, Mo 1.15, V .25	Air Movement A
Cold Work Dies (Blanking, Forming, Shearing)	SPECIAL OIL HARDENING Oil Hardening	C .90, Mn 1.20, Cr .50, W .50	Oil Mach. 90 Movement +A
Cold Work Dies (Blanking, Forming, Shearing)	404 Air Hardening	C 1.55, Cr 12.00, Mo .75, V .25	Air, Oil Mach. 50 Movement +A
Cutting Tools (Finishing)	FAST FINISHING Water Hardening	C 1.35, W 3.50	Water Mach. 65 Movement —C
Cutting Tools (Roughing)	B-F HIGH SPEED High Speed	C .72, Mn .30, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 50 Movement +A
Cutting Tools (Roughing)	COBALT HIGH SPEED High Speed	C .72, Mn .30, Cr 4.00, W 18.00, Mo .50, V 1.00, Co 5.00	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing)	SPECIAL M-O High Speed	C .82, Mn .30, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil, Air Mach. 55 Movement +A
Cutting Tools (Roughing, Finishing)	IXL High Speed	C .80, Mn .30, Cr 4.00, W 19.00, Mo .75, V 2.00	Oil, Air Mach. 45 Movement +A
Die Casting Dies (Brass)	RESCO Air Hardening	C .30, Cr 2.75, W 9.50, Mo .25, Ni 1.75	Air, Oil Mach. 70 Movement +B
Die Casting Dies (Aluminum)	V-HW Air Hardening	C .40, Cr 5.00, Mo 1.25, V 1.00, Si 1.00	Air Movement A
Hot Work (Forming, Shearing)	6-H-W Air Hardening	C .60, Cr 4.00, Mo .45, V .75	Air, Oil Mach. 75 Movement +B
Hot Work Dies (Forming, Punching)	10-H-W Air Hardening	C .35, Cr 5.00, W 1.25, Mo 1.50, Si 1.00, V .25	Air, Oil Mach. 70 Movement B
Hot Work (Hot Forming)	XX-SUPERIOR Air Hardening	C .90, Cr 4.00, Mo .45, V .75	Air, Oil Mach. 75 Movement +B
Hot Work (Punching, Forming)	AIR HARDENING #30 Air Hardening	C .30, Cr 3.50, W 9.00, V .25	Air, Oil Mach. 70 Movement +B
Hot Work (Punching, Shearing, Forming)	AIR HARDENING #40 Air Hardening	C .50, Cr 3.00, W 15.00, V .50	Air, Oil Mach. 65 Movement +B
Hot Work (Punches, Dies)	C-V	(Listed Above)	
Hot Work (Punching, Forming)	RESCO	(Listed Above)	
Hot Work (Punching, Forming)	550 Oil Hardening	C .45, Mn .65, Cr 1.60, Mo 1.10, V .25	Oil Mach. 80 Movement +B
Plastic Mold Dies (Hubbed Cavities)	PLASTIC DIE Water Hardening	C .08 Max., Mn .10 Max.	
Shock Resisting (Intermittent Impact)	UA-4 Oil Hardening	C .50, Mn .60, Cr 1.00, W .25	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	M-TUNGSTEN Oil Hardening	C .50, Mn .35, Cr 1.00, W 1.00	Oil, Water Mach. 80 Movement B
Shock Resisting (Repeated Impact)	SPECIAL AUTO-A Oil Hardening	C .30, Mn .65, Cr .90, V .20	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	SPECIAL AUTO-D Oil Hardening	C .50, Mn .65, Cr .90, V .20	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	SPECIAL PUNCH Water Hardening	C .55, Mn .85, Cr .30, V .30 Si 2.00	Water, Oil Mach. 80 Movement —B

JOSEPH T. RYERSON & SON INC., P.O. Box 8000-A, Chicago 80, Ill. — Listing No. 41

Chisels, Drills	VD CHISEL STEEL Water Hardening	C .77, Mn .35, Mo .18, Si .23	Water
Cold Work Dies	RY-ALLOY Oil Hardening	C .92, Mn 1.65, Mo .27, Si .29	Oil
Cold Work Dies	RY-DIE Air Hardening	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25	Air
Cold Work Dies	VD Water Hardening	C 1.00, Mn .23, V .18, Si .25	Water
Plastic Forming Dies	RY-ALLOY	(Listed Above)	
Punching and Shearing	VD	(Listed Above)	

SIMONDS SAW & STEEL CO., Ohio St., Lockport, N. Y. — Listing No. 42

Cold Work Dies	C.C.M. Air Hardening	C 1.55, Mn .25, Cr 12.00, Mo .80, V .35, Si .35	Air Movement A
Cold Work Dies	SIMONDS AIRTRUE Air Hardening	C 1.00, Mn .65, Si .25, Cr 5.25, Mo 1.00, Va .30	Air
Cold Work Dies	TEENAX No. 46 Oil Hardening	C .90, Mn 1.25, Cr .50, W .50, V .20, Si .20	Oil Movement A
Cutting Tools	BLUE LABEL Water Hardening	C as desired, P .02 max., S .02 max, V optional	Water
Cutting Tools	DIAMOND S Water Hardening	C as desired, P .025 max., S .025 max, V optional	Water
Cutting Tools	LOCKPORT SPECIAL High Speed	C .80, Cr 4.25, W 18.50, Mo .70, V 2.25	
Cutting Tools	MOLVA-T High Speed	C .80, Cr 4.00, W 5.75, Mo 4.50, V 1.60	
Cutting Tools	RED STREAK High Speed	C .72, Cr 4.00, W 18.00, V 1.00	
Cutting Tools	S.T.M. High Speed	C .80, Cr 3.75, W 1.50, Mo 8.75, V 1.25	
Hot Work Dies	CHROME HOT DIE Air Hardening	C 1.00, Mn .30, Cr 4.00, Si .30	Air
Hot Work Dies	D.N.V. Hot Work Oil, Air Hardening	C .32, Mn .30, Cr 3.25, W 9.50, V .40, Si .35	Air, Oil
Shock Resisting	COMMANDO 47 Oil Hardening	C .47, Mn .25, Cr 1.40, W 2.00, Mo .25, V .25, Si .80	Oil
Shock Resisting	HAVOC Water, Oil Hardening	C .50, Mn .40, Mo .50, V .20, Si 1.00	Water

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. % Machinability Annealed Movement in Hardening.
SWEDISH-AMERICAN STEEL CORP., 429 Kent Ave., Brooklyn 11, N. Y.			**Listing No. 43**
Cold Work Dies	HY PRO Oil, Air Hardening	C 1.65, Mn .35, Cr 11.00-12.00, Mo .80, V .30, Si .30	Still Air Movement A
Cold Work Dies	NON PA REIL Oil Hardening	C .90, Mn 1.15, Cr .50, W .50, V .20, Si .25	Oil Movement A
Cold Work Dies	WHITE LABEL Water Hardening	C .90-1.05, Mn .35, Si .25	Water Movement B
Cold Work Dies	YELLOW LABEL Water Hardening	C .95-1.10, Mn .35, V .20, Si .25	Water Movement B
High Speed	BRILLIANT Oil, Air Hardening	C .75, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .25	Oil Movement B
Plastic Molding Dies	HOBRITE Pack Hardening, Carburized	C .05, Mn .11, Si .05	
Plastic Molding Dies (Master Hobs)	DURAX Oil Hardening, Carburized	C .45, Mn .25, Cr 1.15, W 2.50, Si .75	Oil Movement A
TENNESSEE COAL AND IRON DIV., U.S. STEEL CO., Brown-Marx Bldg., Birmingham 2, Ala.			**Listing No. 44**
General Purpose Carbon Steel Tools	TENNESSEE SPECIAL Water Hardening	C .90-1.01, Mn .30-.50, Si .15-.30	Water or Oil Mach. 100 Movement + A
TIMKEN ROLLER BEARING CO., 1835 Dueber Ave., S.W., Canton 6, O.			**Listing No. 45**
Cold Work Dies (Blanking, Forming, etc.)	GRAPH-MO Oil Hardening	C 1.45 avg., Mn 1.00 max., Mo .25 avg., Si .90 avg.	Oil Mach. +100 Movement A
Cold Work Dies (Bar, Tube Drawing, Draw Dies, Stainless)	GRAPH-TUNG Water Hardening	C 1.50 avg., Mn .50 max., W 2.80 avg., Mo .50 avg., Si .65 avg.	Water or Brine Mach. 85 Movement B
Cut Off Bushing	GRAPH TUNG (Listed Above)		
Dies (Bar, Tube Drawing, etc.)	GRAPH-AL Water Hardening	C 1.50 avg., Mn .30 max., Si .15-.25, Al .12-.20	Water or Brine Mach. Movement B 100
Dies (Blanking, Cold Forming, etc.)	GRAPH M.N.S. Air Hardening	C 1.50 avg., Mn 1.25 avg., Cr .50 avg., Mo .50 avg., Si 1.00 avg., Ni 1.75 avg.	Air Mach. 85 Movement A
Lathe Centers	GRAPH-TUNG (Listed Above)		
Punches (Blanking, Forming, Piercing, etc.)	GRAPH-MO (Listed Above)		
Tube Drawing Mandrels	GRAPH-AL (Listed Above)		
UDDEHOLM CO. OF AMERICA INC., 155 E. 44th St., New York 17, N. Y.			**Listing No. 46**
Cold Work Dies (Coining, Swaging, Blanking, Cold Forming)	UHB 711 Oil Hardening	C .50, Mn .20, Cr 1.15, W 2.50, V .20, Si .75	Oil Mach. 85 Movement B
Cold Work Dies (Lamination, Trimming, Blanking, Cold Forming)	TRI-MO Air Hardening	C 1.50, Mn .30, Cr 12.00, Mo .80, V .20, Si .30	Air Mach. 60 Movement A
Cold Work Dies (Blanking, Cold Forming)	UHB Water Hardening	C 1.05, Mn .30, Si .25	Water Movement B
Cold Work Dies (Blanking, Cold Forming)	UHB-46 Oil Hardening	C .90, Mn 1.10, Cr .50, W .50, V .10, Si .35	Oil Mach. 100 Movement A
Cold Work Dies (Blanking, Stamping, Trimming, Cold Forming)	UHB-151 Air Hardening	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .20, Si .25	Air Movement A
Die Casting Dies	UHB ORVAR 2 Oil Hardening	C .35, Cr 5.00, Mo 1.25, V 1.00, Si 1.10	Air Movement A
Die Casting Dies	UHB-711 (Listed Above)		
Hot Work Dies (Hot Forming, Hot Punching, Shearing)	UHB ORVAR 2 (Listed Above)		
Hot Work Dies (Hot Forming, Hot Punching, Shearing)	UHB-711 (Listed Above)		
Plastic Molding Dies (Hubs)	UHB-711 (Listed Above)		
Plastic Molding Dies (Hubbed Cavity Dies, Hobbed Cavity Dies)	UHB FORMA Water Hardening	C .04, Mn .06, Si .03	Water For Hobbing Movement B
Plastic Molding Dies (Machine Cut Cavity Dies)	UHB-46 (Listed Above)		
Punching and Shearing	UHB-711 (Listed Above)		
Shock Resisting (Intermittent, Repeated Impact)	UHB-711 (Listed Above)		
UNIVERSAL-CYCLOPS STEEL CORP., Station St., Bridgeville, Pa., and Titusville, Pa.			**Listing No. 47**
Cold Work Dies (Blanking, Forming)	CYCLOPS SPECIAL Water Hardening	C 1.00, Mn .25, Si .25	Water Mach. 100 Movement + C
Cold Work Dies (Blanking, Forming)	EK-81 Air Hardening	C 1.35, Mn .25, Cr 12.75, Mo .80, Co 3.00, Si .25	Air Mach. 185 Movement + A
Cold Work Dies (Blanking, Forming)	SPARTA Air Hardening	C 1.00, Mn .65, Cr 5.25, Mo 1.10, V .25, Si .30	Air Mach. 135 Movement + A
Cold Work Dies (Blanking, Forming)	SPARTA 80 Air Hardening	C .80, Mn .65, Cr 5.25, Mo 1.10, V .25, Si .30	Air Mach. 130 Movement + A
Cold Work Dies (Blanking, Forming)	ULTRADIE #1 Air Hardening	C 2.25, Mn .25, Cr 12.00, Mo .80, V .20, Si .25	Air Mach. 200 Movement + A
Cold Work Dies (Blanking, Forming)	ULTRADIE #2 Air Hardening	C 1.50, Mn .25, Cr 12.00, Mo .80 V .25, Si .25	Air Mach. 185 Movement + A
Cold Work Dies (Blanking, Forming)	ULTRADIE #3 Air Hardening	C 1.50, Mn .25, Cr 12.00, Mo .80, V .90, Si .25	Air Mach. 185 Movement +
Cold Work Dies (Blanking, Forming)	WANDO Oil Hardening	C .90, Mn 1.20, Cr .50, W .50, V .20, Si .25	Oil Mach. 110 Movement + B
Cutting Tools (Finishing)	B-9 High Speed	C .84, Mn .30, Cr 4.25, W 18.50, Mo .50, V 2.00, Si .35	Oil Mach. 130 Movement + B
Cutting Tools (Finishing)	MOTUNG High Speed	C .80, Mn .30, Cr 4.00, W 1.50, Mo 8.50, V 1.15, Si .35	Oil Mach. 125 Movement + B
Cutting Tools (Finishing)	MOTUNG 652 High Speed	C .82, Mn .30, Cr 4.00, W 6.50, Mo 5.00, V 1.90, Si .35	Oil Mach. 130 Movement + B
Cutting Tools (Finishing)	MOVAN High Speed	C .85, Mn .30, Cr 4.00, Mo 8.50, V 2.10, Si .35	Oil Mach. 125 Movement + B
Cutting Tools (Finishing)	UNICUT High Speed	C .80, Mn .30, Cr 4.00, W 6.25, Mo 6.25, V 2.40, Si .35	Oil Mach. 135 Movement + B

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Roughing)	B-6 High Speed	C .75, Mn .30, Cr 4.00, W 18.00, V 1.10, Si .35	Oil Mach. 130 Movement + B
Cutting Tools (Roughing)	B-7 High Speed	C .75, Mn .30, Cr 4.25, W 18.00, Mo .50, V 1.10, Co 5.00, Si .35	Oil Mach. 130 Movement + B
Cutting Tools (Roughing)	B-8 High Speed	C .78, Mn .30, Cr 4.25, W 14.00, Mo .50, V 2.25, Co 5.00, Si .35	Oil Mach. 130 Movement + B
Cutting Tools (Roughing)	B-10 High Speed	C .80, Mn .30, Cr 4.50, W 18.50, Mo 1.00, V 2.00, Co 9.00, Si .35	Oil Mach. 135 Movement + B
Cutting Tools (Roughing)	SUPER MOTUNG High Speed	C .82, Mn .30, Cr 4.00, W 1.50, Mo 8.50, V 1.25, Co 5.00, Si .35	Oil Mach. 125 Movement + B
Die Casting Dies (Aluminum, Magnesium)	KS Air Hardening	C .35, Mn .40, Cr 5.25, W 5.25, Mo .25, Si 1.00	Air Mach. 125 Movement + A
Die Casting Dies (Aluminum, Magnesium)	THERMOLD A Air Hardening	C .35, Mn .45, Cr 5.00, Mo 1.35, V .40, Si 1.00	Air Mach. 120 Movement + A
Die Casting Dies (Aluminum, Magnesium)	THERMOLD AV Air Hardening	C .37, Mn .45, Cr 5.00, Mo 1.35, V 1.00, Si 1.00	Air Mach. 120 Movement + A
Die Casting Dies (Aluminum, Magnesium)	THERMOLD B Air Hardening	C .35, Mn .30, Cr 5.00, W 1.35, Mo 1.75, Si 1.00	Air Mach. 120 Movement + A
Die Casting Dies (Zinc)	ORION Oil Hardening	C .50, Mn .60, Cr 1.00, V .20, Si .30	Oil Mach. 85 Movement + B
Hot Work Dies	ALCO M Oil Hardening	C .45, Mn .30, Cr 1.50, W 2.25, Mo .50, V .25, Si .35	Oil Mach. 120 Movement + B
Hot Work Dies	ALCO S Oil Hardening	C .50, Mn .30, Cr 1.75, W 2.25, Mo .50, V .20, Si 1.10	Oil Mach. 120 Movement + B
Hot Work Dies	KL Oil Hardening	C .35, Mn .60, Cr 7.50, W 7.50, Si 1.50	Oil Mach. 125 Movement + B
Hot Work Dies	KM Oil Hardening	C .45, Mn .60, Cr 7.50, W 7.50, Si 1.50	Oil Mach. 125 Movement + B
Hot Work Dies	(See ALCO S, KS, THERMOLD A, THERMOLD B, Listed Above)		
Hot Work Dies (Hot Punching, Shearing, Forming)	B44 Oil Hardening	C .35, Mn .25, Cr 3.50, W 11.00, V .45, Si .20	Oil Mach. 125 Movement + B
Hot Work Dies (Hot Punching, Shearing, Forming)	B44J Oil Hardening	C .30, Mn .30, Cr 3.25, W 9.50, V .30, Si .30	Oil Mach. 125 Movement + B
Hot Work Dies (Hot Punching, Shearing, Forming)	B4 Oil Hardening	C .45, Mn .25, Cr 3.50, W 13.25, Si .20	Oil Mach. 125 Movement + B
Hot Work Dies (Hot Punching, Shearing, Forming)	B6X High Speed	C .50, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .30	Oil Mach. 125, Movement + B, + C 85
Hot Work Dies	THOR	C .33, Mn .35, Si .50, Cr 12.00, W 12.00, V 1.00	Oil Mach. 180 Movement + Water Mach. 100 Movement + C
Plastic Molding Dies (Ejector Pins)	CYCLOPS EXTRA Water Hardening	C 1.00, Mn .30, Si .25	
Plastic Molding Dies (Ejector Pins)	VENANGO Oil Hardening	C 1.50, Mn .45, Mo .50, V .20, Si 1.10	Oil Mach. 115 Movement + B
Plastic Molding Dies (Ejector Pins)	(See ALCO S, Listed Above)		
Plastic Molding Dies (Hubs)	(See ALCO S, SPARTA, SPARTA 80, ULTRADIE #2, VENANGO, Listed Above)		
Plastic Molding Dies (Machine Cut Cavities)	UNILOY 1435 Oil Hardening	C .40, Mn .40, Cr 13.00, Si .30	Oil Mach. 150 Movement + B
Plastic Molding Dies (Machine Cut Cavities)	UNILOY 1860 Oil Hardening	C .60, Mn .40, Cr 17.00, Si .30	Oil Mach. 175 Movement + B
Plastic Molding Dies (Machine Cut Cavities)	WANDO	(Listed Above)	
Plastic Molding Dies (Machine Cut Cavities)	(See SPARTA, THERMOLD A, THERMOLD B, Listed Above)		
Punching and Shearing	CYCLOPS 67 Water, Oil Hardening	C .55, Mn .75, V .20, Si 2.00	Water, Oil Mach. 115 Movement + C, + B
Punching and Shearing	DRACO Water Hardening	C 1.00, Mn .30, V .20	Water Mach. 100 Movement + C
Punching and Shearing	VENANGO SPECIAL	C .68, Mn .50, Si 1.30, V .20, Mo .50	Oil Mach. 115 Movement +
Punching and Shearing	(See ALCO M, ALCO S, CYCLOPS SPECIAL, EK-81, ORION, SPARTA, SPARTA 80, ULTRADIE #2, VENANGO, WANDO, Listed Above)		
Shock Resisting (Intermittent Impact)	ORION	(Listed Above)	
Shock Resisting (Repeated Impact)	(See ALCO M, ALCO S, CYCLOPS 67, VENANGO, VENANGO SPECIAL, Listed Above)		

VANADIUM-ALLOYS STEEL CO., Latrobe, Pa., (also Anchor Drawn Steel Co., Colonial Steel Co.)

Listing No. 48

Cold Work Dies (Blanking)	AIRHARD Air Hardening	C 1.00, Mn .70, Cr 5.25, Mo 1.10, V .25, Si .30	Air Mach. 85 Movement A
Cold Work Dies (Blanking)	COLONIAL NO. 6 Oil Hardening	C .95, Mn 1.20, Cr .50, W .50, V .20, Si .30	Oil Mach. 90 Movement A
Cold Work Dies (Blanking)	CROCAR Air, Oil Hardening	C 2.20, Mn .20, Cr 12.00, V .80, Co .50, Si .30, Mo .80	Oil, Air Mach. 40 Movement A
Cold Work Dies (Blanking)	OHIO DIE Air Hardening	C 1.55, Mn .25, Cr 12.00, Mo .80, V .80, Co .40, Si .38	Air Mach. 45 Movement A
Cold Work Dies (Cold Forming)	(See AIRHARD, OHIO DIE, CROCAR, Listed Above)		
Cutting Tools (Roughing)	RED CUT COBALT Oil, Air Hardening, High Speed	C .73, Mn .20, Cr 4.25, W 18.25, Mo .65, V 1.08, Co 4.75, Si .30	Oil Mach. 50 Movement A
Cutting Tools (Roughing)	RED CUT COBALT B Oil, Air Hardening, High Speed	C .78, Mn .25, Cr 4.25, W 18.50, Mo .75, V 1.85, Co 8.75, Si .30	Oil Mach. 45 Movement A
Cutting Tools (Roughing)	VASCO SUPREME Oil, Air Hardening, High Speed	C 1.50, Mn .25, Cr 4.75, W 12.50, V 5.00, Co 5.00, Si .25	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	EVM Oil, Air Hardening, High Speed	C .85, Mn .25, Cr 4.25, W 18.10, V 2.00, Si .35	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	NEATRO Oil Hardening, High Speed	C 1.27, Mn .25, Cr 4.50, W 5.50, Mo 4.50, V 4.00, Si .30	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	RED CUT SUPERIOR Oil, Air Hardening, High Speed	C .72, Mn .20, Cr 4.00, W 18.00, V 1.00, Si .30	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	VAN-LOM Oil Hardening, High Speed	C .87, Mn .20, Cr 4.00, Mo 8.25, V 1.95, Si .30	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	VASCO M-2 Oil, Air Hardening, High Speed	C .83, Mn .25, Cr 4.20, W 6.35, Mo 5.00, V 1.90, Si .30	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	8-N-2 Oil Hardening, High Speed	C .79, Mn .20, Cr 3.75, W 1.50, Mo 8.60, V 1.10, Si .25	Oil Mach. 60 Movement A

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium ★ % Machinability Annealed Movement in Hardening.
Die Casting Dies (Ejector Pins)	HOTFORM Air Hardening	C .35, Mn .30, Cr 5.00, W Opt., Mo 1.40, V .45, Si .90	Air Mach. 75 Movement A
Die Casting Dies (Ejector Pins)	MARVEL Oil Hardening	C .33, Mn .20, Cr 3.50, W 9.75, V .50, Si .30	Oil Mach. 60 Movement A
Gages	(See AIRHARD, COLONIAL NO. 6, OHIO DIE, RED CUT SUPERIOR, Listed Above)		
Gages	COLONIAL NO. 7 Water Hardening	C Opt., Mn .20, V .20, Si .25	Water Mach. 100 Movement C
High-Stress Machinery Parts	VANADIUM TYPE D Water Hardening	C .50, Mn .20, Cr .80, V .20, Si .25	Water Mach. 90 Movement C
High-Stress Machinery Parts	VANADIUM TYPE G Water Hardening	C .60, Mn .20, Cr .80, V .20, Si .25	Water Mach. 90 Movement C
High-Stress Machinery Parts	VANADIUM TYPE H Water, Oil Hardening	C .70, Mn .20, Cr .80, V .20, Si .25	Water Mach. 90 Movement C
High-Stress Machinery Parts	VANADIUM TYPE K Water, Oil Hardening	C .80, Mn .20, Cr .80, V .20, Si .25	Water Mach. 90 Movement C
High-Stress Machinery Parts	VANADIUM TYPE N Water, Oil Hardening	C .92, Mn .20, Cr .80, V .20, Si .25	Water Mach. 90 Movement C
High-Stress Machinery Parts	VANADIUM TYPE BB Water, Oil Hardening	C 1.00, Mn .32, Cr 1.40, V .20, Si .25	Water Mach. 85 Movement C
High-Stress Machinery Parts	NIKRO M Oil Hardening	C .70, Mn .55, Cr .85, Mo .25, Si .30, Ni 1.40	Oil Mach. 75 Movement A
High-Stress Machinery Parts	SILMAN Water, Oil Hardening	C .55, Mn .85, Cr .25, V .20, Si 2.00	Water Mach. 85 Movement C
Hot Work Dies (Hot Forming)	FORGE DIE Oil Hardening	C .26, Mn .25, Cr 3.50, W 14.00, V .50, Si .25	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	HOTFORM NO. 3 Air Hardening	C .52, Mn .30, Cr 4.75, W 1.20, Mo 1.40, Si .90	Air Mach. 75 Movement A
Hot Work Dies (Hot Forming)	RED CUT SUPERIOR J Oil Hardening	C .52, Mn .20, Cr 4.00, W 18.00, V 1.00, Si .32	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	SC SPECIAL Oil Hardening	C .47, Mn .30, Cr 2.75, W 14.00, V .50, Si .30	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	(See HOTFORM, MARVEL, Listed Above)		
Hot Work Dies (Hot Punching & Hot Shearing)	(See HOTFORM, MARVEL, FORGE DIE, Listed Above)		
Plastic Molding Dies (Ejector Pins)	(See HOTFORM, Listed Above)		
Plastic Molding Dies (Hubs)	PAR-EXC Oil Hardening	C .50, Mn .20, Cr 1.65, W 2.00, V .25, Si .25	Oil Mach. 80 Movement A
Plastic Molding Dies (Hubs)	(See AIRHARD, COLONIAL NO. 6, CROCAR, OHIO DIE, Listed Above)		
Plastic Molding Dies (Machine Cavities)	SPEED-CUT Oil, Air Hardening	C .43, Mn .85, Cr 1.12, Mo .50, Si .30	Oil Mach. 140 Movement A
Plastic Molding Dies (Machine Cavities)	(See HOTFORM, Listed Above)		
Punching and Shearing	(See AIRHARD, COLONIAL NO. 7, OHIO DIE, SILMAN, Listed Above)		
Shock Resisting (Intermittent Impact)	MOSIL Oil Hardening	C .57, Mn .85, Cr .25, Mo .33, Si 1.90	Oil Mach. 85 Movement B
Shock Resisting (Intermittent Impact)	(See PAR-EXC, SILMAN, Listed Above)		
Shock Resisting (Repeated Impact)	COLONIAL NO. 14 Water Hardening	C Opt., Mn .25, Si .25	Water Mach. 100 Movement C
Shock Resisting (Repeated Impact)	(See COLONIAL NO. 7, SILMAN, Listed Above)		

VASCOLOY-RAMET CORP., 800 Market St., Waukegan, Ill. — Listing No. 49

Cutting Tools (Chip Removal, Cast Iron and Nonferrous Roughing)	2A68, Carbide	Cutting Tools (Chip Removal, Steel, Precision Boring)	EH, Carbide
Cutting Tools (Chip Removal, Cast Iron and Nonferrous General Purpose)	2A5, Carbide	Cutting Tools (Light Impact)	2A3, Carbide
Cutting Tools (Chip Removal, Cast Iron and Nonferrous Light Finishing, Precision Boring)	2A7, Carbide	Cutting Tools (Severe Impact)	2A1, Carbide
Cutting Tools (Chip Removal, Steel, Severe Roughing)	AW, Carbide	Cutting Tools (No Shock)	2A68, Carbide
Cutting Tools (Chip Removal, Steel, Roughing)	EE, Carbide	Cutting Tools (Light Shock)	2A3, Carbide
Cutting Tools (Chip Removal, Steel, General Purpose)	EM, Carbide	Cutting Tools (Heavy Shock)	2A1, Carbide
Cutting Tools (Chip Removal, Steel, Finishing)	E, Carbide	Cutting Tools (Wear Applications, Heat, Corrosion Resistance)	TANTUNG G Cast Cobalt-Chromium-Tungsten Alloy

VULCAN CRUCIBLE STEEL CO., No. 1 Main St., W. Aliquippa, Pa. — Listing No. 50

Cold Work Dies	FORT PITT Water Hardening	C .70-1.00, Mn .30	Water Movement C
Cold Work Dies (Blanking)	SPECIAL VANADIUM Water Hardening	C .80-1.15, Mn .30, V .30	Water Movement C
Cold Work Dies (Drawing)	REGAL Water Hardening	C 1.35, W 3.50	Water Movement C
Cold Work Dies (Forming)	K.R. Water Hardening		Water Movement C
Cold Work Dies (Blanking, Forming)	ALIDIE Oil, Air Hardening	C 1.55, Cr 12.00, Mo .75, V .25	Oil, Air Movement A
Cold Work Dies (Blanking, Forming)	EXTRA Water Hardening	C .80-1.20, Mn .30	Water Movement C
Cold Work Dies (Blanking, Forming)	HARDRITE Oil Hardening	C 1.10, Cr .60, W 1.75, V .25	Oil Movement A
Cold Work Dies (Blanking, Forming)	NON-SHRINK Oil Hardening	C .90, Mn 1.50, Cr .20	Oil Movement A
Cold Work Dies (Blanking, Forming)	OIL HARDENING Oil Hardening	C .90, Mn 1.20, Cr .50, W .50	Oil Movement A

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADE NAME & TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed. Movement in Hardening.
Cold Work Dies (Blanking, Forming)	SPECIAL Water Hardening	C .80-1.40, Mn .30	Water Movement C
Cold Work Dies (Blanking, Forming)	VAIRLOY Air Hardening	C 1.00, Mn 2.00, Cr .90, Mo .90	Air Movement A
Cold Work Dies (Blanking, Forming)	VULDIE Air Hardening	C 1.00, Mn .70, Cr 5.25, Mo 1.10, V .30	Air Movement A
Cutting Tools	SUPER High Speed	C .80, Cr 4.00, W 18.50, Mo .75, V 2.00	Oil, Air Movement B, A
Cutting Tools	FM-6 High Speed	C .83, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil, Air Movement B, A
Cutting Tools	WOLFRAM High Speed	C .70, Cr 4.00, W 18.00, V 1.10	Oil, Air Movement B, A
Cutting Tools	WOLFRAM COBALT High Speed	C .72, Cr 4.00, W 18.00, Mo .50, V 1.00, Co 5.00	Oil, Air Movement B, A
Cutting Tools (Finishing)	REGAL (Listed Above)		
Die Casting Dies (Brass)	A-42 Oil, Air Hardening		Oil, Air Movement B, A
Die Casting Dies	TCM Air Hardening	C .35, Cr 5.00, W 1.25, Mo 1.50, Si 1.00	Air Movement A
Die Casting Dies	VULCAST Air Hardening	C .40, Cr 5.00, V 1.00, Mo 1.25	Oil, Air Movement B, A
Gages	(See ALIDIE, NON-SHRINK, OIL HARDENING, VAIRLOY, Listed Above)		
High Stress, High Wear Machinery Parts	AUTO Oil Hardening		Water, Oil Movement C, B
High Stress, High Wear Machinery Parts	HECLA Water, Oil Hardening		Water, Oil Movement C, B
Hot Work Dies	A-41 Oil Hardening		Oil Movement B
Hot Work Dies	Q. A. Oil Hardening	C .50, Cr 1.20, W 2.20, V .25	Water, Oil Movement C, B
Hot Work Dies	30 CALO FERRO Oil, Air Hardening	C .30, Cr 3.50, W 9.00, V .25	Oil, Air Movement B, A
Hot Work Dies	45 CALO FERRO Oil, Air Hardening	C .45, Cr 3.00, W 13.00, V .25	Oil, Air Movement B, A
Hot Work Dies	(See A-42, TCM, CALO-FERRO, VULCAST, Listed Above)		
Hot Work Dies (Forming)	4-HW Air Hardening	C .90, Cr 4.00, Mo .45, V .75	Air Movement A
Hot Work Dies (Forming)	6-HW Air Hardening	C .60, Cr 4.00, Mo .45, V .75	Air Movement A
Plastic Molding Dies (Hubbed)	PLASTIC DIE Water Hardening	C .10 max.	Water Movement B
Plastic Molding Dies (Hubbed)	VULMOLD To Be Carburized	C .10 Max., Cr 1.30, Ni .60, Mo .25	Oil Movement A
Punching and Shearing (Hot)	(See A-42, .30 CALO FERRO, .45 CALO FERRO, Q.A., TCM, Listed Above)		
Shock Resisting	BLUE EDGE Water, Oil Hardening	C .50, Cr 1.00, W 1.00	Water—Movement C Oil—Movement B
Shock Resisting	4870 Water, Oil Hardening	C .55, Mn .85, Cr .25, V .30, Si 2.00	Water, Oil Movement C, B

WESSON CO., 1220 Woodward Heights Blvd., Detroit 20, Mich. — Listing No. 50A

Cutting Tools	Carbides	Six standard and two special grades

WILLEY'S CARBIDE TOOL CO., 1340 W. Vernor Highway, Detroit 1, Mich. — Listing No. 51

Cutting Tools (Chip Removal, Cast Iron, Nonferrous Roughing)	E-8, Carbide	Cutting Tools (Chip Removal, Steel, Precision Boring)	509, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous General Purpose)	E-6, Carbide	Cutting Tools (Wear Surface—No Shock)	E-6, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous Light Finishing)	E-5, Carbide	Cutting Tools (Wear Surface—Light Shock)	E-8, Carbide
Cutting Tools (Chip Removal, Cast iron, Nonferrous Precision Boring)	E-3, Carbide	Cutting Tools (Wear Surface—Heavy Shock)	E-18, Carbide
Cutting Tools (Chip Removal, Steel, Roughing)	945, Carbide	Cutting Tools (Impact—Light)	E-13, Carbide
Cutting Tools (Chip Removal, Steel, General Purpose)	710, Carbide	Cutting Tools (Impact—Medium)	E-18, Carbide
Cutting Tools (Chip Removal, Steel, Finishing)	606, Carbide	Cutting Tools (Impact—Heavy)	E-25, Carbide

ZIV STEEL & WIRE CO., 2945 W. Harrison St., Chicago 12, Ill. — Listing No. 52

Cold Work Dies (Blanking)	HARGUS Oil Hardening		C .85-.95, Mn 1.40-1.60, Cr .10-.15, Mo .20-.30, Si .25-.30	Oil
Cold Work Dies (Forming, Punches, Rolls)	PRK-33 Air Hardening	(Darwin & Milner)	C 1.30-1.50, Mn .20-.30, Cr 12.00-13.00, Co 3.00-3.50, Si .40-.60	Air
Cold Work Dies (Blanking, Forming)	NEOR Oil Hardening	(Darwin & Milner)	C 2.10-2.30, Mn .40-.60, Cr 12.75-13.75, Si .40-.60, Ni .40-.60	Oil
Cold Work Dies (Rolls)	DUMORE Air Hardening		C .95-1.05, Mn .50-.80, Cr 5.00-5.50, Mo .95-1.25, Si .10-.30	Air
Cutting Tools	SUPER HIGH SPEED Oil Hardening		C .65-.75, Mn .20-.35, Cr 3.50-4.50, W 17.50-19.00, V .90-1.20, Si .20-.35	Oil
Gages	NEOR	(Listed Above)		
Hobs	WIZARD Oil Hardening		C .40-.50, Mn .20-.40, Cr .85-.95, W .90-1.00, Mo .20, Si .15-.25	Oil
Hobs Cavity Dies	HOBALITE Water Hardening		C .05, Mn .16, Si .026	Water
Hot Work Dies (Hammer)	TYPLEX Air Hardening		C .35-.45, Mn .25-.50, Cr 1.25-1.75, Mo .60-.90, V .15-.25, Ni 4.00-4.50	Air
Hot Work Dies (Upsetter)	TYPLEX	(Listed Above)		
Machinery Parts	ZIVAN-45 Oil Hardening		C .40-.50, Mn .60-.90, Cr .80-1.10, V .15-.18	Oil
Punching and Shearing	DUMORE	(Listed Above)		
Punching and Shearing	PLANCHER Oil Hardening		C .60-.70, Mn .70-.90, Si 1.90-2.10	Oil
Shock Resisting	WIZARD	(Listed Above)		

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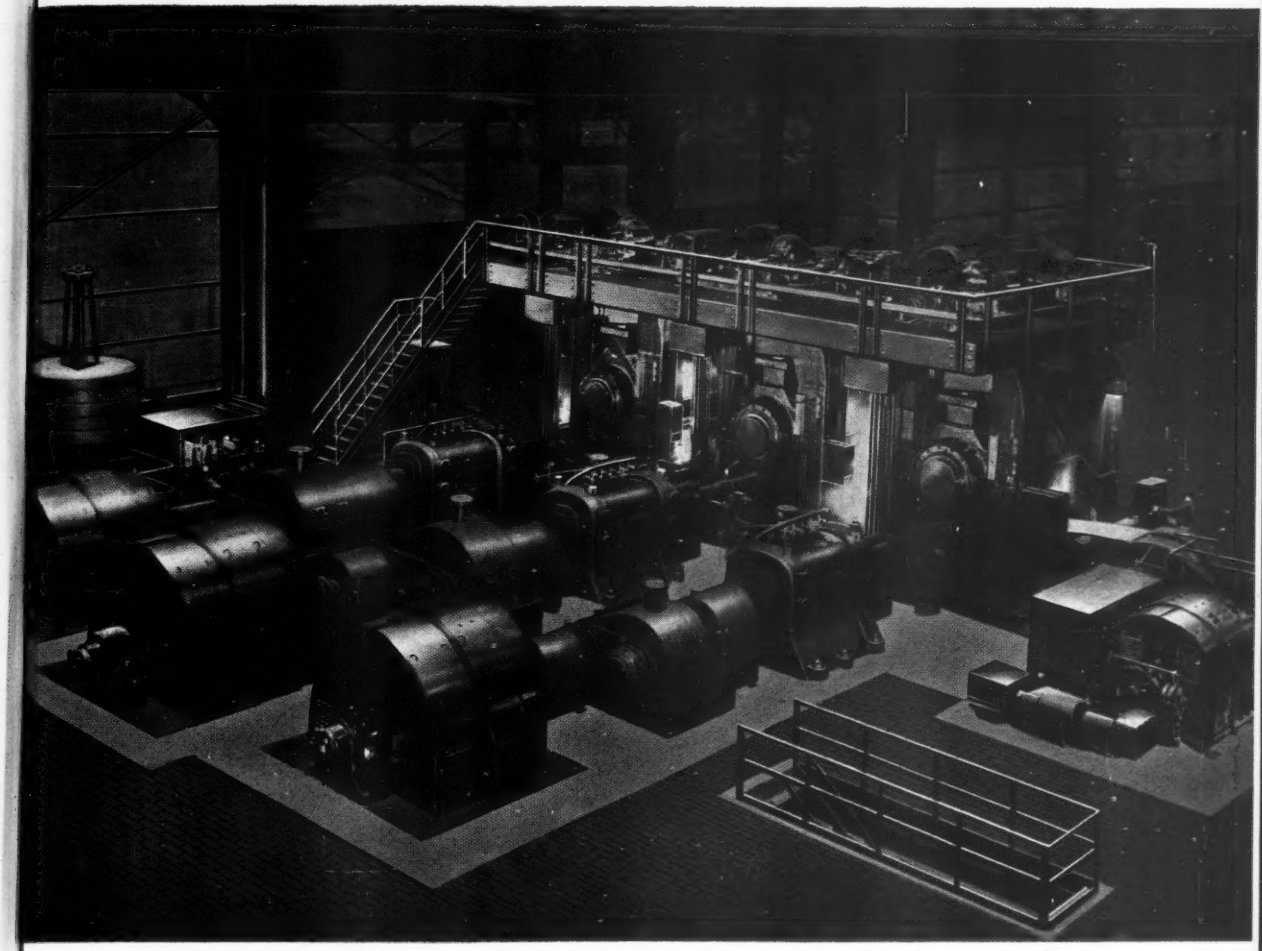

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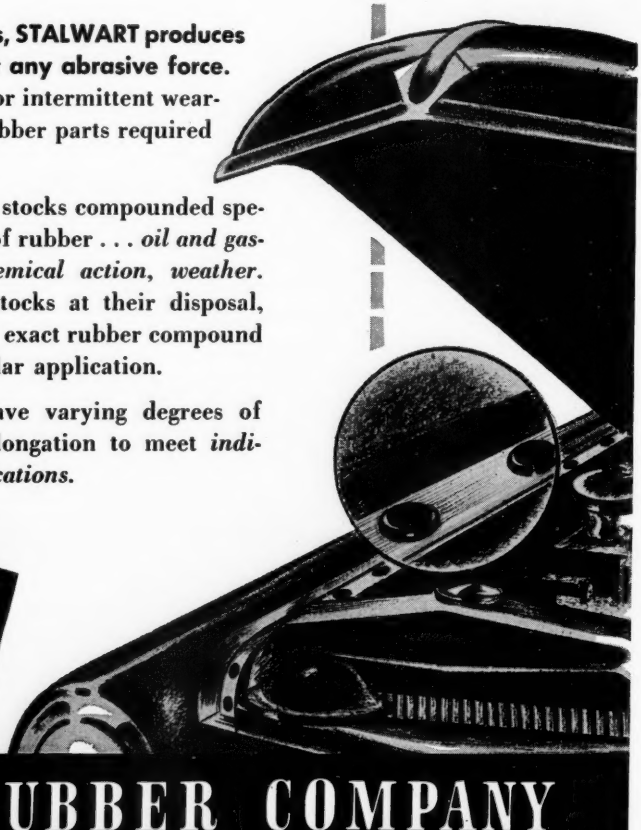

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OXYACETYLENE powder cutting installation at one plant's operation stepped up production more than three times, according to Linde Air Products Co., New York.

Installation consists of three beds and a carriage cab which mounts the cutting equipment. While billets are being cut on one bed, the second is unloaded and the third loaded.

Carriage cab runs on tracks alongside the billet beds. An Oxweld cutting machine travels on a 10-inch machined I-beam that is fastened to the cab. Machine cuts through the 3-inch billets at 15 inches per minute.

Takes a Powder—Iron-rich powder is used in the flame to get quick starts. Operator in the cab controls the cutting operation. When cuts on one bed have been completed, the machine is returned to the starting position by a pulley and cable drum arrangement. Cab moves to the next bed and the operation is started again.

Four men make up the cutting crew: Operator; two chain men, who load and unload beds; and a crane operator.

Adds Conditioners to Output

Fresh'nd-Aire Co., division of Cory Corp., this week began turning out production models of the first of two electric air conditioning units at their main Chicago plant.

The units, which have been extensively field tested during the past few months, will come in ½ and ¾-ton capacities.

The room air conditioners are enclosed in heavy-gage bonderized cabinets.

Production of these conditioners, together with the recent introduction of a portable electric dehumidifier, now gives the company a complete line of air treatment equipment, including electric fans, heater-fans, commercial air circulators and room humidifiers.

Petroleum Dictionary Offered

If you're short on technical background and stumped by petroleum jargon, a new "Petroleum Dictionary and Products Manual" prepared by Petroleum Educational Institute, Los Angeles, may come in handy. This 502-page book contains 6164 entries and 2113 illustrations. It defines terms, but also gives information on fundamentals and application of petroleum products.

Included are definitions of hundreds of lubricating and other oils and more than a score of different gasolines. Data dealing with additives generally used in fuels and lubricants are summarized and terms dealing with drilling and production of crude oil explained.

4000-Ton Hydraulic Press Will Hot Form Body Parts in Railway Car Production

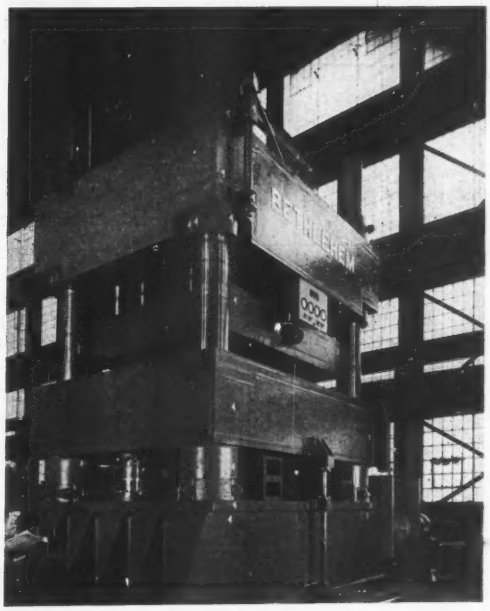
HYDRAULIC PRESS that can be operated as a single action unit by clamping the blankholder to the top platen has been completed by Bethlehem Steel Co. Built at the company's Bethlehem, Pa., plant, the big 4000-ton upstroke, double-action stamper will be used by a railway equipment manufacturer for hot-forming car body parts.

In double action, the press has adjustable blankholder pressure providing a 0 to 1000-ton range. Suspension rods have adjustable stops for limiting the 24-inch maximum blankholder stroke. Maximum press stroke is 48 inches.

Press has a main ram 58 inches diameter and two smaller lifting rams. It is designed to operate on a primary pressure system of 1500 psi. This can be boosted to 2250 psi and 3000 psi through two intensifiers. It exerts 2000, 3000 or 4000-ton-force, either by pressure from the line system or by increasing pressure with the intensifiers. The latter operate by means of automatic valves and their use is selective.

Daylight is adjustable by raising or lowering the upper platen. This is accomplished with movable platen and blocking. An ejector with 150-ton-capacity is located in the platen.

Overall height reaches about 33 feet, including a basement section. In forming railroad car body parts, it will operate at a speed of 2½ pressing cycles per minute. Weight is estimated at 978,000 pounds.



This huge hydraulic press for forming car bodies operates at a speed of 2½ pressings per min. Adjustable blankholder pressure provides 0-1000-ton pressure in double action. Maximum stroke is 48 inches

BLAST FURNACE PRACTICE

By CHARLES E. AGNEW
Consultant
Blast Furnace and Sintering Plant Operations
Cleveland

Beneficiation of Air—XI(c)

Here, the importance of the effects of the raw material chemical composition and the blowing rate on the shaft raw material preparation capacity is emphasized

COMPARISON of bosh and hearth temperature relationships for a furnace operation using a lean Lake ore mix and high ash coke, with changes in fluxing stone percentages and mineral composition of slags, is presented in Fig. 22.

As indicated, with 75 per cent calcite and 25 per cent dolomite stones the ratio of the assumed bosh temperature head to the initial slag formation temperature is 1.01/1.00. The like ratio to the tapping slag temperature is 1.18/1.00. Temperature relationship at the initial stage of slag formation is comparable to the "calcite" slag at South (Fig. 19) and for similar reasons the temperature head indicated would not be of value to the furnace operation.

Dolomite Operation—With the use of 100 per cent dolomite stone, the ratio of the temperature head to both the initial formation and the tapping slag temperatures is 1.04/1.00. A reduction of 392° F, or 11.55 per cent, in the initial slag formation temperature is a definite benefit to the shaft operation because of the affect of the high temperature on the gas velocity. However, with a reduction in the basicity stage temperature there is a sacrifice of ratio between the temperature head and the tapping slag temperature, and the margin of safety between the low point of the bosh working range temperature and the tapping slag temperature is only 52° F.

Because of the characteristic variables in the chemical composition of virtually all natural Lake ores, the indicated margin is not sufficient for the adequate control of a safe temperature head ratio for the smelting operation.

With smelting zone temperature relations indicated with the 75 per cent calcite and 25 per cent dolomite stones, the use of oxygen-enriched air would only aggravate the indicated unfavorable relationships. But the use of it with the 100 per cent dolomite slag would increase and/or support the ratio of the temperature head to the tapping slag temperature without any ill-affect on the temperature

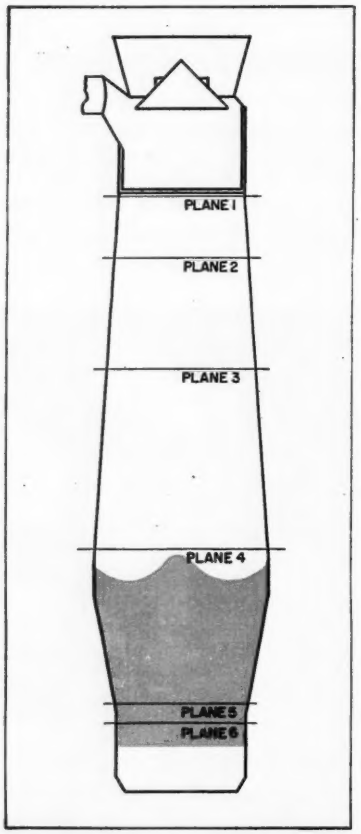


Fig. 20 — Effects of raw material chemical composition, blowing rate on burden mixture in Southern shaft

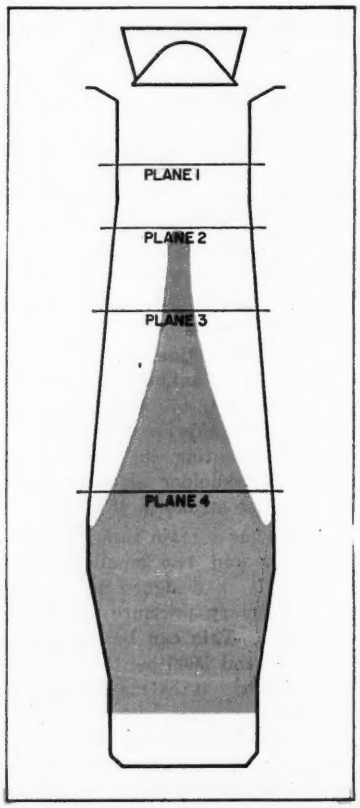
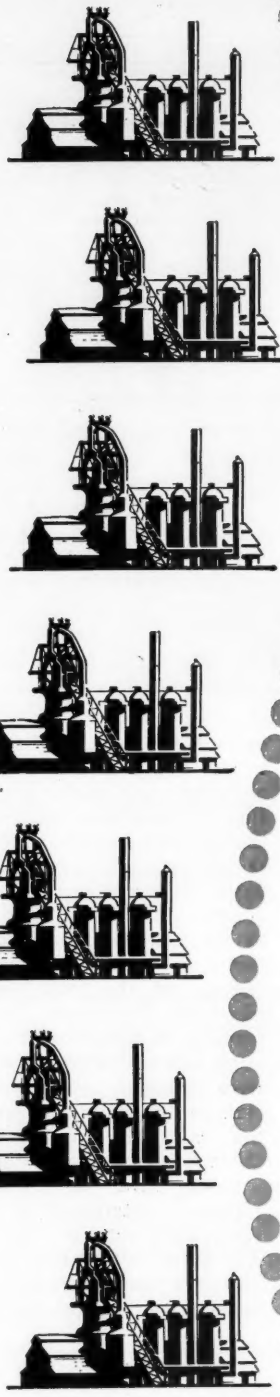


Fig. 21 — Effects of raw material chemical composition, blowing rate on burden mixture in Northern shaft



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at the initial stage of slag formation[20].

Affects of raw material chemical composition and the blowing rate on the shaft raw material preparation capacity are illustrated with actual measurements by the Bureau of Mines research.[2] Fig. 20 is a cross section drawing of the Southern furnace and Fig. 21 of the Northern furnace where the research was conducted. Approximate dimensions of the high temperature smelting zones of the two furnaces, indicated by the recorded temperatures, have been superimposed on the cross section drawings.

Initial Fusion Zone — At the Southern furnace samples of solids taken from the furnace indicated initial fusion occurred at plane 4 with a recorded temperature of 1660° F at the center of the furnace and 1538° F at the side wall (see Fig. 12). At Northern furnace the temperature recorded at the center of the furnace at plane 4 was 2000° F and at the sidewall 1400° F. The temperature of 1660° F, sufficient to cause initial fusion, was recorded above plane 2 —over 34 feet higher in the furnace than at the Southern furnace (see Fig. 11)

Considering the cubical displacement between plane 4 and the zero stockline as the low temperature raw material preparation zone of the furnace, approximately 37 per cent of the Northern furnace zone was occupied by a cone having a temperature in excess of the raw material preparation requirements. Inevitably, the effect of the excess temperature would be reflected in an increased gas velocity through the stock column and a decreased ratio of raw material preparation capacity to smelting capacity.

[2] U. S. Bureau of Mines *Technical Papers*, Nos. 391 and 442.

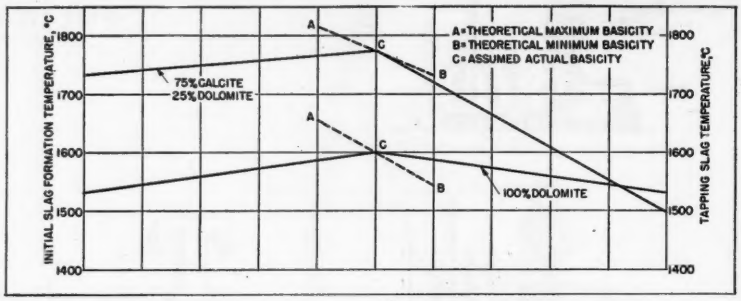


Fig. 22—Comparison of bosh and hearth temperature relationships

		75% calcite & 25% dolomite				100% dolomite			
	Melting temp.° C	Initial formation %	— Basicity — maximum %	— Basicity — minimum %	Tapping stage %	Initial formation %	— Basicity — maximum %	— Basicity — minimum %	Tapping stage %
Akermanite	1458	24.24	....	17.40	63.42	4.56	....	....	1.91
Calcium bisilicate	1540	....	....	....	2.86	....	....	....	....
Anorthite	1551	....	....	....	....	....	....	....	20.18
Gehlenite	1590	10.87	11.21	15.12	26.65	10.89	11.24	15.11	7.46
Calcium orthosilicate	2130	36.91	47.33	36.07	....	4.02	14.23	2.50	....
Tricalcium disilicate	1475	....	....	....	7.03	....	....	....	....
Monticellite	1498	28.00	40.82	31.42	....	80.56	71.91	81.06	71.47
Magnesia	2650	....	.63	....	....	....	3.62	1.32	....
		100.02	99.99	100.01	100.00	100.00	100.00	99.99	100.02
Calculated average temp.:									
Centigrade		1732	1815	1733	1495	1532	1654	1541	1530
Fahrenheit		3150	3299	3151	2723	2790	3011	2807	2822

The blowing rate for the Southern furnace was greater than for the Northern furnace (Table IX) but the heat consumed for evolving the combined volatile matter (CO_2) from the stock held the initial fusion plane low in the furnace; without similar means for consuming heat the fast blowing rate at the Northern furnace created the high temperature zone, as illustrated. The calculated initial slag formation temperature for the Southern furnace was 2743° F and for the northern furnace 2732° F. Since the initial slag formation occurs below the initial fusion plane the positive ill-affect of the high initial slag formation temperature on the depth of the high temperature zone and on the relation of the material preparation to smelting capacity is obvious.

Affect of High Velocity—A high rate of gas velocity through the stock column does not contribute anything to stock preparation since it decreases the length of time for the gas-solid contact and the efficient transfer of heat from gas to stock, and increases the loss of heat taken from the furnace by the gas. Also, since the ill-affect is imparted to the major percentage of the total weight of materials discharged from the furnace, its influence on the operating economy is greater than if it were imparted in an equal percentage to the minor weight of the materials discharged (see Table XVIII).

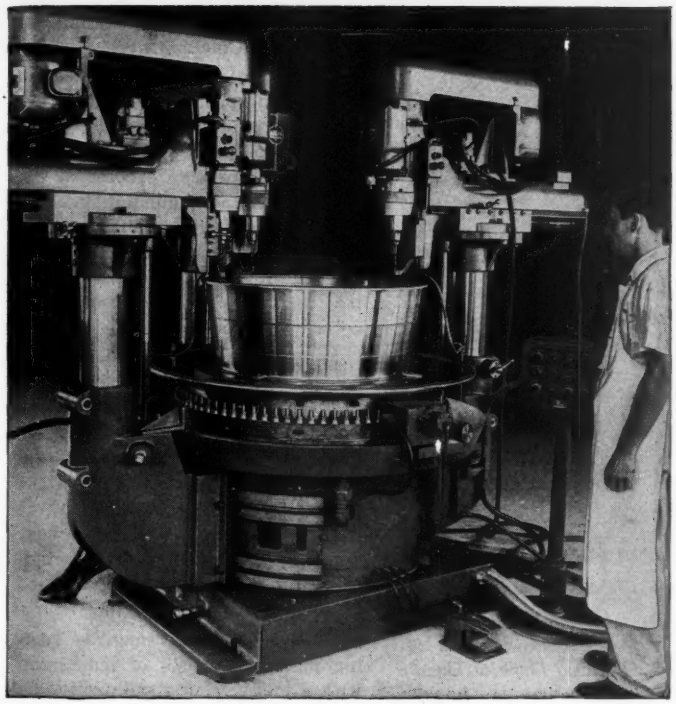
Stock travel rate through the furnace is determined by the coke combustion rate at the tuyeres. All other coke-carbon reactions (solution loss, direct reduction of oxides, flue dust and pig iron car-

Table XX

Weight of gases per cubic foot at 32° F and atmospheric pressure

(Natural air=0.080728-lb, oxygen=0.08921-lb, nitrogen=0.07831-lb, hydrogen=0.00559-lb, and carbon monoxide=0.07807-lb)

Air			Pounds				Pounds			
Volume cu ft	Weight lbs	% Oxygen in air	Oxygen in air	Carbon @ 0.75% O_2 wt.	Coke @ 90% FC	Btu @ 4370 Btu per lb C	Nitrogen	Oxygen	Carbon	Gas
50,000	4036.40	23.000	928.372	696.279	773.643	3042739.23	3108.028	928.372	696.279	4732.679
45,000	3632.76	25.555	928.352	696.264	773.626	3042673.68	2704.590	928.352	696.264	4329.206
(10.00% reduction in air weight + 2.555% increase in oxygen weight=8.50% reduction in gas weight)										
50,000	4036.40	23.000	928.372	696.279	773.643	3042739.23	3108.028	928.372	696.279	4732.679
50,000	4036.40	25.555	1031.502	773.626	859.585	3380745.62	3005.100	1031.502	773.626	4810.228
(2.555% increase in oxygen=11.10% increase in coke combustion rate. Gas weight increase=1.63%)										



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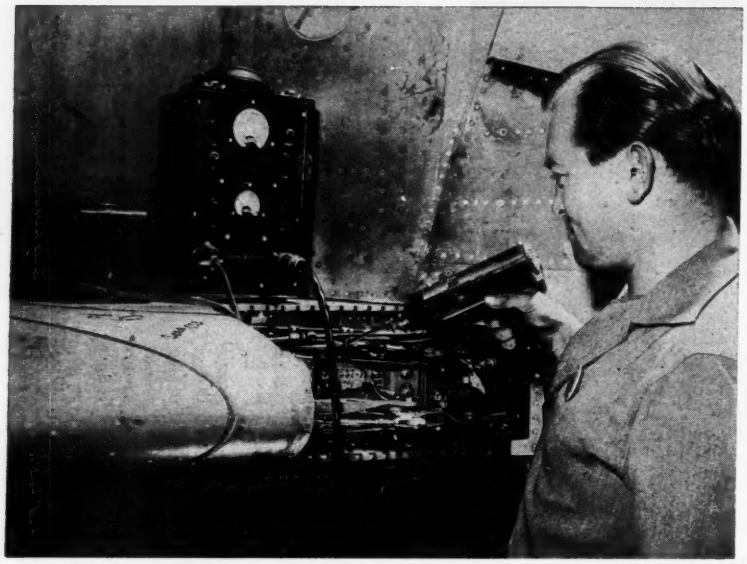


Quick Check for Fuel Cell Leaks

Portable, pistol-like detector speeds leak checking in aircraft fuel cells. Sensitive to halogens, the unit spots defects in bag, vent, entrance, flow fittings and attach lines of self-sealing and bladder-type cells. General Electric Co. developed the detector, used here by North American Aviation, Los Angeles

bon) are always minor in percentage of coke consumption. The carbon combustion rate at the tuyeres always is determined by the weight of oxygen delivered to the furnace in a given unit of time. Inevitably, the enrichment of natural air with oxygen will increase the coke combustion rate and the stock travel rate through the furnace in constant ratio with an increase in oxygen enrichment. Table XX indicates the following conditions:

1. With the blast volume and weight decreased 10 per cent and natural air oxygen content increased 2.555 per cent, the coke combustion rate and stock travel rate remain constant. The heat volume generated remains constant with the coke combustion rate but the gas weight produced decreases 8.50 per cent.
2. With the blast weight and the volume held constant and the oxygen content increased 2.555 per cent coke, the combustion rate and the heat volume generated are increased 11.10 per cent while the gas weight produced is increased only 1.63 per cent.

The certainty of increased heat consumption by the stock with the increase in the stock travel rate is readily apparent but conditions governing the heat recovery created by increasing the stock travel rate with increased weight of natural air and with decreased weight of oxygen-enriched air differ considerably. Any increase in the weight of the natural air used will increase the gas weight in direct proportion.

(To be continued)

Tool Life Tests Faster

Radioactive tracers may make machinability data available quicker and easier

RADIOACTIVE tracers may prove valuable aids to engineers seeking methods to lengthen tool life.

Because tool life—or amount of metal removed per resharpening of the tool—is a prime factor in gaging production costs, steps taken to better performance must be checked accurately and quickly. This makes a controlled laboratory testing setup essential for determining degree of efficiency effected by improved cutting fluids, work materials and machining conditions.

Report on the progress made in refining techniques in tracer testing methods was made by research executives of Cincinnati Milling Machine Co. They presented their paper at the American Society of Mechanical Engineers' semiannual meeting in Cincinnati.

Promise of Speed — Application of radioisotopes to this testing appears to hold considerable promise for speeding and simplifying the slow, expensive process of obtaining such machinability data. Result may be to make many more measurements possible in a given time, at less cost and with much less material, say Cincinnati's research men.

They suggest that the new method also offers even a further prospect for advancing machining practice and science. This, they report, should result because it provides a means for exploring in the laboratory the basic mechanisms that cause cutting tools to wear and fail. Fundamental information is gained that can be applied in practice to improve tool life.

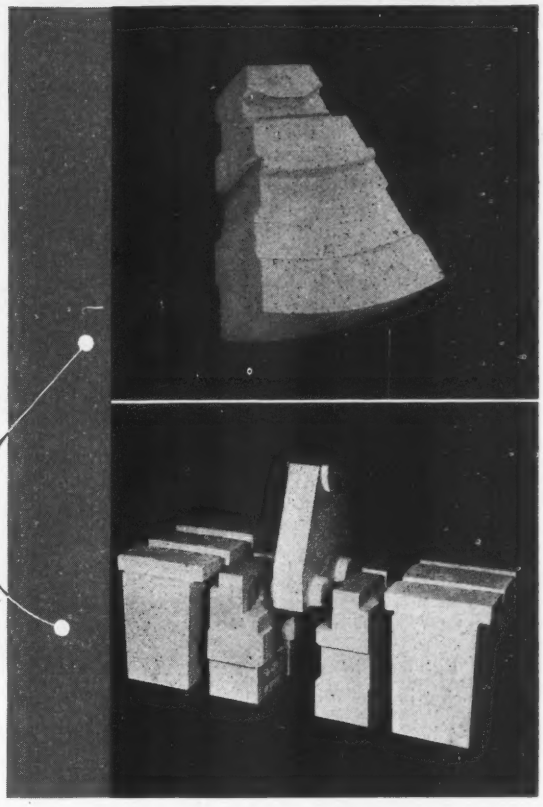
Method of Measurement — Testing method consists of machining with a tool rendered radioactive by neutron irradiation in a nuclear reactor. Next step calls for collecting resulting chips and measuring their radioactivity due to particles abraded from the tool during the few seconds of cutting. Amount of this radioactivity is a direct measure of the amount of radioactive tool material worn away.

This means it is also a direct measure of tool wear rate, because it has been found that well over 90 per cent of radioactive tool material worn away during cutting remains attached to the chips.

Exploratory Stage—Because the rate of cutting tool's wear is essentially constant throughout its life, a measurement of instantaneous rate of wear is a direct measure of relative tool life, the report states. Cincinnati's research engineers say they have run tests with different types of work materials, cutting fluids and under varying cutting conditions. Some preliminary studies of fundamental mechanisms in the wear process also are complete.

They add that the method must still be considered in the exploratory stage. But results already obtained in evaluating fluids, materials and conditions indicate its ability to supply the much-needed rapid tool life test.

PE 84 nose tile made of LACO "600" special refractory



1000 to 1300 Heats

at ¼ the cost

with LACO "600" Special Refractory

Tile components, Laclede tile suspended arch

Records up to 1340 heats on Noses and Fan Tails have been reported by large Eastern steel mills using LACO "600" special refractory in Open Hearths and in hot zones of Slab Heating Furnaces.

Now proven in performance, LACO "600" was field tested for over ten years in advanced Open Hearth designs on new furnaces and rebuilds. *Of 28 furnaces equipped by Laclede Arch Company in the last two years,* ranging in size from 165 tons capacity to 275 tons capacity, most are utilizing LACO "600" on fan tails, noses, chill walls, or burner arches.

LACO "600" cuts heat losses, keeps maintenance expenses down, costs less to install and has long service life, improves furnace operation, reduces air infiltration, saves *time* and money. **It costs one-quarter as much as expensive chrome and magnesite brick sometimes used in Fan Tail and Nose construction.**

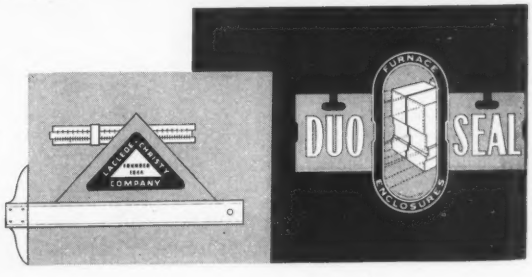
Yes, these locations have tough operating conditions, but LACO "600" special refractory meets these conditions with service and economy. Why does a clay brick costing so little perform so well?

The answer, backed up by ten years of field tests, lies in the unique combination of refractory properties, high resistance to spalling, excellent volume stability, high melting point, uniformity, **plus the method of suspension.** All of this adds up to *increased furnace availability at the right price.*

Let's go **downstairs** to cut costs and step up production and furnace availability with *Suspended* LACO "600".

Every type of refractory or suspension has its proper economical place.

Let us show you some designs and performance records.



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Ryan production "pipeline" stretches 140 feet through heart of plant. The manifolds are picked up at this end after they have been spot welded on adjacent jigs

MORE OUTPUT, LESS FLOOR SPACE

Motorized Line Speeds Manifold Assembly

New fabrication setup built around a continuous belt conveyor system did the trick for Ryan when its floor space shrank as orders piled up

IS FLOOR space your problem?

Is it disappearing under a maze of new machines and assembly lines? If it is, then perhaps what Ryan Aeronautical Co. did may help you.

Squeezed b e t w e e n expanding production requirements for Army tank manifolds and stepped-up orders from other important customers, the San Diego, Calif., company found its floor space shrinking.

Dig for Ideas—Something had to be done about it, and fast. Factory supervisors were forced to dig for ideas. The result:

A new, motorized assembly line technique, unique in the exhaust systems manufacturing industry; one that expanded output and cut factory space requirements about in half.

Conceived around a continuous belt conveyor system, the new fabrication line turns out thousands of exhaust manifolds for the Continental model 1790 engines which power the M-46 and M-47 General Patton tanks. Stretching 140 feet through the heart of the Ryan plant, the motorized belt neatly solved the two problems that perplexed production experts for several months.

Three Minds Solve It—Solution to the dilemma came jointly from Robert Clark, assistant production manager; Ray Ortiz, manifold production superintendent, and Floyd Bennett, manifold assembly foreman.

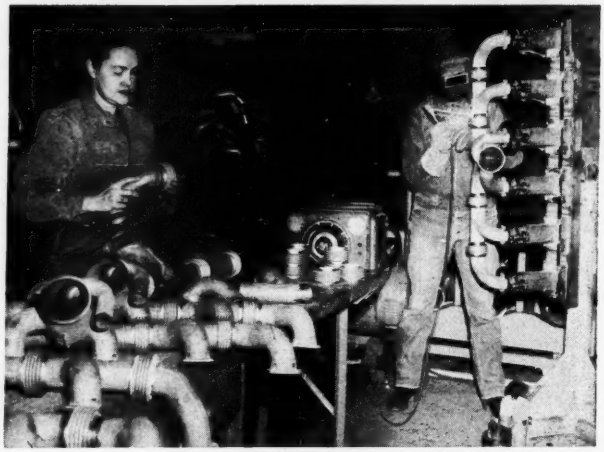
The decision was based on the use of a continuous belt conveyor system similar to that used in the food packaging industry, with the 1790 program streamlined to fit straight-line assembly methods. This was a distinct departure from the standard practice in the industry.

The Old Way—Since its inception, exhaust systems manufacturing was considered to be more like the garment-making industry than any other, because both produce innumerable models and sizes of the product without too many changes in equipment.

Consequently, Ryan production machines were arranged along logical parts "flow" lines, and the various components threaded through them in the fabrication process. Machines were placed so trucks brought the parts to them. Also pathways of the different parts sometimes became widely divergent because of the varying requirements of each model.

New Approach—With a straight-line assembly system, a new approach had to be visualized. The machines, tools and jigs had to be

Arc welders flanking the moving production line are in curtained booths to protect the other employees from flying sparks. Flanges are attached at this point



Line spills finished sections in bins for subsequent use. Girl, left, attaches flexible bellows joints; the welder joins several sections into engine bank

carefully positioned along the line. Exact number and spacing of these elements had to be co-ordinated with the conveyor line speed.

Careful timing of each operation was demanded. The 1790 exhaust manifold consists of five separate and differing components: An outlet section, two midsections and two end-sections. Each requires different operations performed upon it but all must flow down the same production line at uniform speed.

Backtracking Out — Eighteen separate tasks, such as assembly, welding, sandblasting, sizing, facing and inspection, must be performed along the line and no backtracking of the parts is allowed at any time.

Smooth dove-tailing of these operations had to be planned to insure that the prescribed proportions of each manifold would arrive at the end of the conveyor line.

Engineering and tooling changes were worked out to permit the parts to be made under these conditions.

The Payoff—As soon as the new assembly line rolled into action it became apparent that it was the answer. Production of 1790 Continental manifolds substantially increased and the space occupied by the entire line is only half of that which would have been required by the former method of fabrication.

In addition, the new belt line system raised efficiency by reducing employee fatigue, preventing parts damage, simplifying training and providing better control of parts.

Parts in Easy Reach—Key function of the motorized belt is to bring the parts in a uniform flow within easy reach of every employee. This relieves him from having to move about to get and dispatch parts, load conveyor trucks and wait for others to bring components to him.

The operation saves his time and energy. It also permits the telescoping of all machines into minimum space because room for truck delivery is no longer required

Parts are maintained in top condition as they are fabricated because they are transported upon a rubber-impregnated belt.

Help Problem Eased—Time required to orient experienced employees to the assembly pattern is stepped up from 2 hours to only 30 minutes because the complete sequence of operations is laid out along a straight line which can be quickly understood by a newcomer.

Certain employees also are trained for all tasks so they can be substituted in place of those who may miss work because of illness.

Other Advantages—Control of parts and fabrication rates is simplified because the foreman can see at a glance where all components are, and determine causes for shortages or delays without walking around and looking in several areas.

An added premium resulting from the installation of the new system is the approval of the employees who work on the line. Generally, they like the new method and welcome the benefits which it brings to them in facilitating their work.

Who Built It—The conveyor system was built and installed by Standard Engineering Co. of Los Angeles.

The conveyor belt is a continuous loop, 280 feet long and 22 inches wide, made of rubber-impregnated canvas. It is suspended over steel rollers along the 140-foot assembly line and wound around steel, rubber-coated drums at each extremity.

Power is supplied by an electric varidrive motor which can be adjusted to provide belt speeds running from a few inches to several feet per minute. A magnetic push-button starter actuates the system.

Added Touch—Ryan specified the addition of a steel shelf which is located on each side of the belt so parts can be removed from the conveyor without creating a storage problem at any station along the line.

The width of the belt and shelves is designed to give complete access to parts from both sides of the belt line.

How to solve 39 PRODUCTION PROBLEMS with Mead Air Devices

SEE how to use standard Mead units to make automatic or semi-automatic machines!

New 16-page Mead PHOTO-BOOKLET presents actual examples in pictures and text of 39 different, tough production problems solved by various combinations of Mead Air Operated Devices. This interesting booklet shows how to:

(1) De-burr small parts fast **(2)** Press 3 components together **(3)** Tap die cast knobs **(4)** Insert rubber discs into metal cups for insecticide "bombs" **(5)** Swage hubs to hypodermic needles **(6)** Ream center hole in valve plate **(7)** Broach 2 internal slots in brass valve inserts, handling 4 sizes **(8)** Press filters into copper shells and indent dimple in shell **(9)** Tap 2 holes ⅝ in brass brush holders. **(10)** Drill and tap a 1/4–20 hole 9.16 deep then ream "bell-mouth" in stainless steel forging **(11)** Drill and ream a hole to controlled depth in brass valve body. **(12)** Drill No. 52 hole thru end of solid graphite pencil. **(13)** Press plastic liners into perfume bottle caps **(14)** Drill cast iron gas burners **(15)** Drill ¼ hole thru steel axle of fishing reel **(16)** Carry copper rods thru series of gas flames to braze special tips to lower ends. **(17)** Chamfer hole in spark-plug bodies approx. 3,600 per hour **(18)** Swage steel ball into brass nose of ballpoint pen approx. 3,600 per hour **(19)** Assemble patented brass couplings and flare neck into nut to simultaneously form fluid-tight seat **(20)** Drill twin holes in chain-saw teeth **(21)** Counter sink both sides small washers, wheels, rollers approx. 4,000 per hour. **(22)** Press shafts, bushings into plastic knobs **(23)** Drill and tap 5-40 threads in rectangular brass electric terminals, approx. 2,400 per hour **(24)** Crimp together 2 thin spring members of pen assembly **(25)** Press brass shells over cast iron cores of doorknob assemblies **(26)** Crimp saddles to plastic radio tube sockets **(27)** Stamp trademark on brass plugs approx. 3,600 to 4,000 per hour **(28)** Press ferrules on wood handles **(29)** Assemble paper hangers' tool roller to yoke by inserting pin thru collar **(30)** Feed, spin finials onto screw of lamp shade holder **(31)** Crimp eyelet and ring on pen barrel **(32)** Drill and tap 2 holes 8-32 in aluminum BX connectors **(33)** Drill ⅝ hole in aluminum part, chamfer both top and bottom of hole, approx. 2,000 per hour **(34)** Cap cathode tubes for TV sets at 3,200 per hour **(35)** Fill pen tubes with ink, insert ball point assembly at one pass **(36)** Bend precut copper tubes 90° at 4,000 per hour **(37)** Drill 2 holes in brass castings, fed to 2-spindle drill head **(38)** Hold plastic bead, drill hole, eject **(39)** Drill bushing for 2 size clevis pins.

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BUILD YOUR OWN

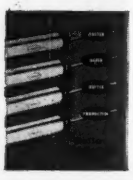
with Bellows "Packaged" Pneumatic Units

Delivery of special purpose machine tools stretches far into the months. But, often, you can combine a little tool room ingenuity with Bellows "Controlled-Air-Power" Devices and build in your own plant special machines that will break production bottlenecks wide open.

Take the machining operations pictured here. All were runs long enough to warrant special tools and tooling. Yet all are being mass produced by inexpensive tool-room-built special machines, made from standard machine tool components readily available. Machining operations are fed and controlled by Bellows "packaged" pneumatic work or tool feeding devices, synchronized with one another, electrically controlled. In most cases a single unskilled operator is producing automatically two to three times the production formerly obtained.

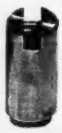
If you have a manufacturing operation where a special machine would double or triple production it will pay you to get in touch with your local Bellows Field Engineer—a man skilled in solving special production problems. He is listed in your phone directory under "The Bellows Co."

May We Send You This Interesting Booklet?



Case history stories, diagrams, photo, production details, etc., showing how Bellows "Controlled-Air-Power" Devices can help you obtain more production at lower cost. No obligation. Write: The Bellows Co., Dept. ST652, Akron 9, Ohio. Ask for Bulletin CL-30.

Doubled Production



Milling

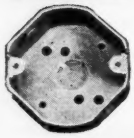
Production Increase 500%

Lathe Turning

Production Increase 400%

Stamping

12,800 Holes Per Hour



Tapping

Production Increase 700%

Drilling

300% Production Gain

Counter Boring

From 125 to 650

Drilling and Tapping

Doubles Production

Bead Rolling

60% Faster

Pin Point Riveting

The Bellows Co.
ESTABLISHED 1911
AKRON 9, OHIO

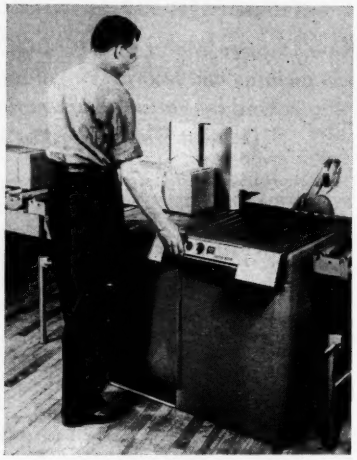
1208

Welder Speeds Strapping

STRAP JOINTS by spot welding is the function of a machine soon to enter production at Acme Steel Co., Chicago. The power-driven unit should up the volume on flat steel strapping work plus effecting a marked decrease in operator effort.

Featuring a streamlined housing for integration into standard conveyor lines, the tool produces welded joints with strengths approaching the tensile strength of the strapping size used. It accommodates a variety of package sizes. No limit is placed on amount of strap that can be fed or amount of slack that can be taken up.

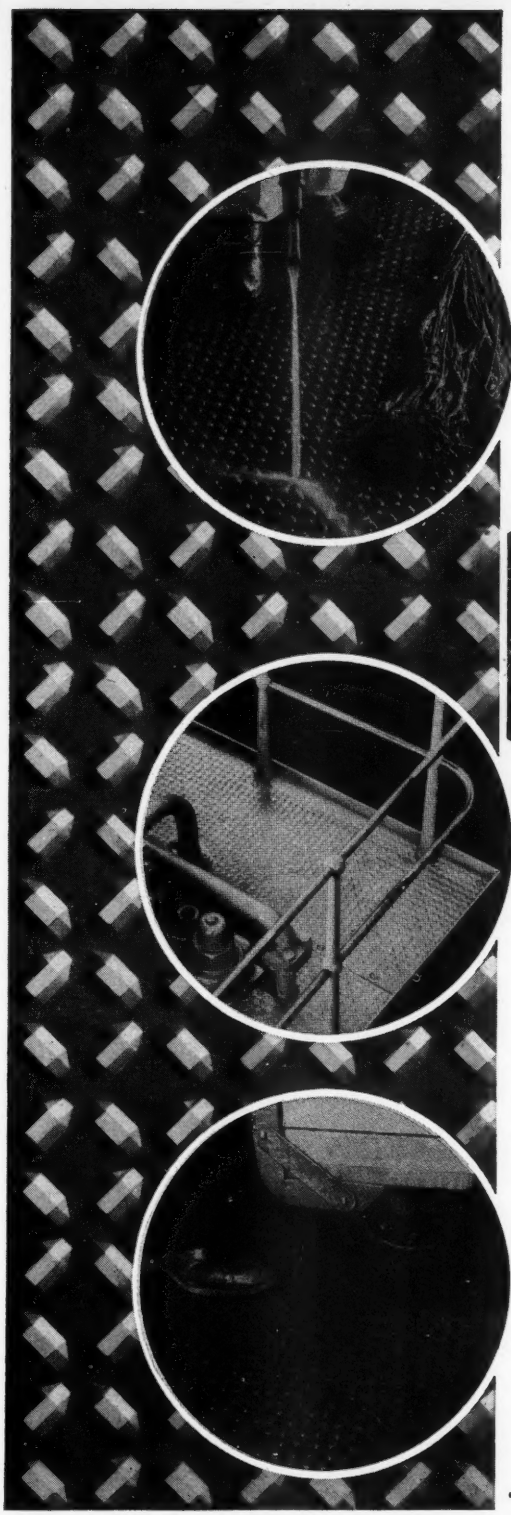
Machine's 31-inch table height permits installation in standard-height conveyor systems. In overall dimensions it is 43⅛ inches wide, 45 inches deep, 47 inches high; weight, 1350 pounds.



STANDARD INSTALLATION
. . . cuts down operator's effort

Location Facilitated — Packages approach on a roller conveyor from the right, leave from the left. Roller sections in the table top facilitate location of packages over the tensioning and welding unit. This eliminates need for manual lifting. Fourteen ball-transfer rollers, built into the table top around the strapping mechanism, reduce handling further by permitting packages to pass over or be turned for cross strapping with little effort.

Operator feeds out required strap length by deflecting strap-



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And swish it all aside!
With Multigrip on step and floor
Oil slicks are out of date,
So make your workers' footing safe . . .
Use Multigrip Floor Plate.

SAFE . . . WET OR DRY! U·S·S Multigrip offers sure footing in all kinds of weather. No matter from which direction Multigrip is approached, there are always several slip proof risers in contact with each foot. Workers can start and stop quickly, *safely*. So guard the danger zones of your plant with U·S·S Multigrip Floor Plate . . . and keep your accident rate down!

Multigrip gives positive traction for vehicles too. There are no gutters to trap a narrow wheel. Wheels roll *on* the flat-topped risers, not *between* them. Get complete information today.

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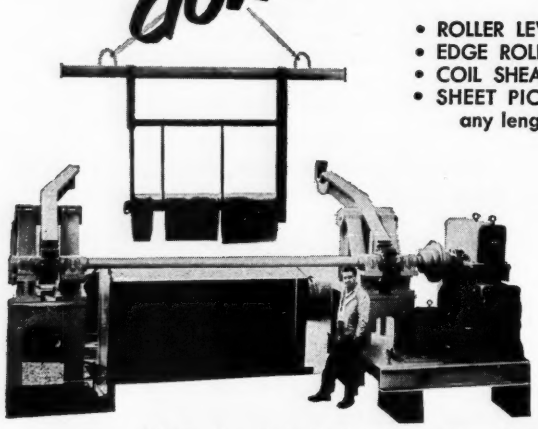

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OFFICE: FRICK BUILDING, PITTSBURGH 22, PA. PLANT: McKEES ROCKS, PA.

length pedal with his foot. He guides the strap around the package and into a v-shaped guide slot in the table top with his right hand. Guide slot centers and locates the entering strap automatically.

Automatic Cycle — When cycle bar is actuated, the machine tightens the strap to a predetermined tension, cuts the strap from the coil and joins by welding. Entire operation is completed in a matter of seconds.

Machine is powered electrically, controlled electronically. Its welding circuit uses 230-v, 60-cycle single-phase current; control circuit uses 115-v, 60-cycle single-phase current.

Back guide, 16 inches high, can be adjusted so large packages are centered properly over the tensioning-welding mechanism. Reel stand holds standard oscillated-wound 100-pound coils. Strapping can be loaded without lifting.

ASTM Offers Copper Standards

All standards advanced by American Society for Testing Materials pertaining to copper and copper-base alloy products are brought up to date in a new 520-page edition.

Standards were developed by ASTM committee B-5 on copper and copper alloys, cast and wrought, with several other society committees. Current edition is also the result of close co-operation among technical representatives from leading producers and consumers.

Summary contains 114 specifications and test methods. It covers plate, sheet, rolled bar and strip; rod, bar and shapes; pipe and tubes; wire; sand and die castings; arc-welding electrodes and brazing solder; standard nominal diameters and cross-sectional areas of American wire gage sizes of solid round wires used as electrical conductors; stranded conductors and other electrical applications for copper.

One group of specifications covers nonferrous metals such as slab zinc, pig lead, nickel, phosphor, silicon and electrolytic cathode copper. Also included are test methods covering expansion, mercurous nitrate, resistivity, tension, micrographs, hardness, sampling

No More "Blue Mondays" in your Plant

Every working day is a "washday" of sorts in metalworking plants like yours. Because there are plenty of production line cleaning jobs that call for the removal of dirt . . . soil, oil, dust, rust, greases, films and compounds of many kinds.

These are the types of cleaning and scouring operations that have nothing to do with soap and water—or "elbow grease." Specially formulated cleaners are required—fast-acting solutions that spread over metals, dig under the dirt and whisk it away with dispatch.

Houghton research over the years—constantly finding new ways to speed processing in metalworking plants—has resulted in products that are helping to make metal cleaning, pickling, plating, tumbling and similar operations more efficient. And at lower costs, metalworking plants report.

Some of these popular Houghton products are described on this page. For further information—and a list of other Houghton products relating to your cleaning problems—ask the Houghton Man when he calls at your plant. Or write directly to E. F. Houghton & Co., Philadelphia 33, Pa.

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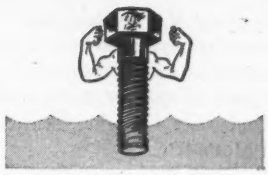
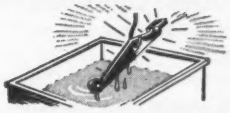
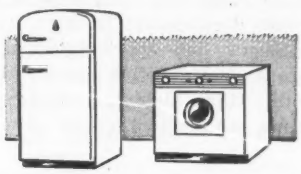


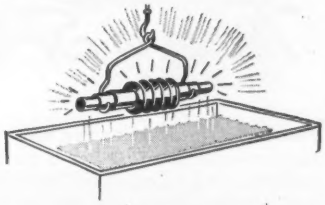
Tough Cleaning Jobs Turn "Sissy" *when Houghto-Clean 220* is used. This popular emulsion-type metal cleaner works fast . . . and it's often used in place of alkaline cleaning. Effective in spray, dip or power washing (diluted as much as 1 to 50!). Like further information?



Cleaning of Parts for Chrome Plating is swift and sure when one of Houghton's *"Cerfak"* synthetic detergents is used in the bath. A prominent car manufacturer, for example, has reported switching to "Cerfak" after extensive tests because it has such exceptional wetting ability and detergency in the preplating bath.



Paints "Hold Tighter" after metal is cleaned with *Houghto-Clean 313.* A phosphate cleaner that provides a perfect bonding agent. Leaves a light tough film that "anchors" paints, enamels and lacquers to metals. Also helps prevent corrosion if finish is scratched or broken. A type for either ferrous or nonferrous metals.



Cleaning Oil-Quenched Work is a job best suited for Houghton's *Cerfak Liquid*—ideal for work heat treated in salt baths. Manufacturers find Cerfak Liquid 6 to 10 times faster than old style cleaners. Only a short soak is needed. *Cerfak Liquid* works so thoroughly that hand brushing of threaded and recessed parts is eliminated. Being so economical, it's widely used for around-the-plant cleaning, too.

Houghton Pioneering in metalworking and processing fields has resulted in a vast amount of helpful production data. Whatever your cleaning problems, ask the Houghton Man. For new cleaning folder, write to E. F. Houghton & Co., Philadelphia 33, Pa.

and grain size evaluations. Recommended practices are indicated for tension test specimens on copper-base alloys for sand castings.

Copies are available from the society for $4.75.

Super Transmission Projected

A "19XX" transmission to operate with a "19XX" motorcar engine was proposed to the Society of Automotive Engineers meeting at Atlantic City, by engineers from General Motors Research Laboratories.

When reviewing the company's high compression engine and automatic transmission development, the engineers outlined a hypothetical transmission that would allow an automotive engine to operate at all times at its most efficient rate.

They pointed out that the past 15 years, and particularly the time since 1946, has been a period of rapid development in both transmissions and spark ignition engines. The question now is, "What will future high compression engines require in the way of a hypothetical transmission to obtain maximum economy?"

After recording data on performance of various high compression test engines, the speakers reported 25-35 per cent gains in fuel economy made in comprehensive road and laboratory tests. They suggested that further substantial gain is possible if their projected transmission can be linked to one of these engines.

Ultra-Thin Bearings

A WEDDING ring with a comparable outside diameter would be about four times as thick as an actual section of the ultra-thin bearings produced by Kaydon Engineering Corp., Muskegon, Mich.

With an outside diameter of 17.625-inch and an inside diameter of 16.875-inch, the cross section of the bearings—which weigh only 2 pounds—measures 0.375-inch.

Special techniques and facilities developed at Kaydon are responsible for the bearings. In the process flame-hardened bearing races are drilled, tapped and gear-cut to eliminate costly auxiliary parts. They help improve machine design, make possible more compact, lighter machines of greater capacity.

Carbide Tool Grinder Imported

Tool grinder made by Peter Wolters, Germany, is offered to the U. S. market by Cosa Corp., New York. Designed for grinding carbide-tipped tools, the machine has two concentric diamond wheels for rough, finish grinding.

Only one setup is necessary for both operations. Tool is clamped on a graduated, compound table that can be adjusted and preset for all cutting angles and radii. Optical micrometer for centering the tool bit and checking nose radius is built into the machine.

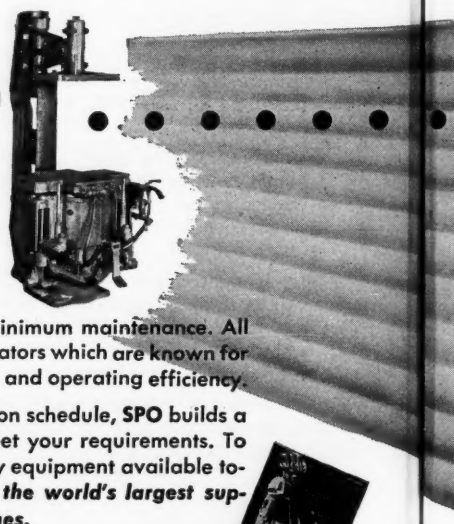
Poof! The Belt Is Dressed

Liquid dressing on leather belts and pulley faces now can be applied like cream on a strawberry shortcake.

Crafton & Knight, Worcester,

FROM THE SMALLEST

There's a SPO for every job!



From the smallest to the world's largest jolt-squeeze-stripper, **SPO** has a model to meet every foundry production need. **SPO** molding machines range from small, portable, manually operated units to fully automatic, push-button giants.

Regardless of its size, each **SPO** molding machine is built for safe, dependable operation and maximum accuracy. Many feature the patented "inverted jolt" mechanism which assures extremely long service life with minimum maintenance. All incorporate **SPO** air vibrators which are known for their sturdy construction and operating efficiency.

Whatever your production schedule, **SPO** builds a molding machine to meet your requirements. To obtain the finest foundry equipment available today, **SPECIFY SPO . . . *the world's largest supplier of molding machines.***

Write today for Bulletin No. 2000 for complete data.

SPO INCORPORATED

817-SI

Mass., is marketing its belt dressing in 12-ounce containers that enables the user to direct a powerful spray of dressing on leather belts simply by depressing a valve with the forefinger.

The package contains enough liquid to treat about 350 square feet of belting. Since the spray can be directed at any point or at any angle, the operator is able to treat moving belts without exposing his hands and arms to danger. The fine mist dressing is transferred evenly to the belt, or to the small pulley face where slippage is most likely to occur.

Metal Blackening Theory Shown

New theory of metal blackening is a development of Lehigh University's Institute of Research and Enthone Inc., New Haven, Conn. Report on the process is being made at the American Electroplaters' Society annual meeting June 16 in Chicago, by Dr. Walter R. Meyer, president of Enthone.

Results were achieved through a thermodynamic study that explains reactions in black nickel plating and sulphide blackening of other metals. Previously, says Dr. Meyers, the chemical reaction of these processes was not known. The new theory permits selection of chemicals and conditions for blackening metals such as steel, stainless steel, zinc and cadmium.

Ceramic Coatings Charted

CERAMIC-COATED metals found applicable in jet airplane engines prompts Barrows Porcelain Enamel Co., Cincinnati, to offer a guide to metals suitable for ceramic coatings in industrial installations.

Guide affords a convenient method of determining metal specifications according to heat resisting properties. The company made no attempt to evaluate physical properties at high temperatures. Therefore, temperatures suggested are based on heat resisting properties only. By following suggested maximum temperatures listed, intergranular corrosion and rupture or failure due to fatigue strains at high temperatures is avoided.

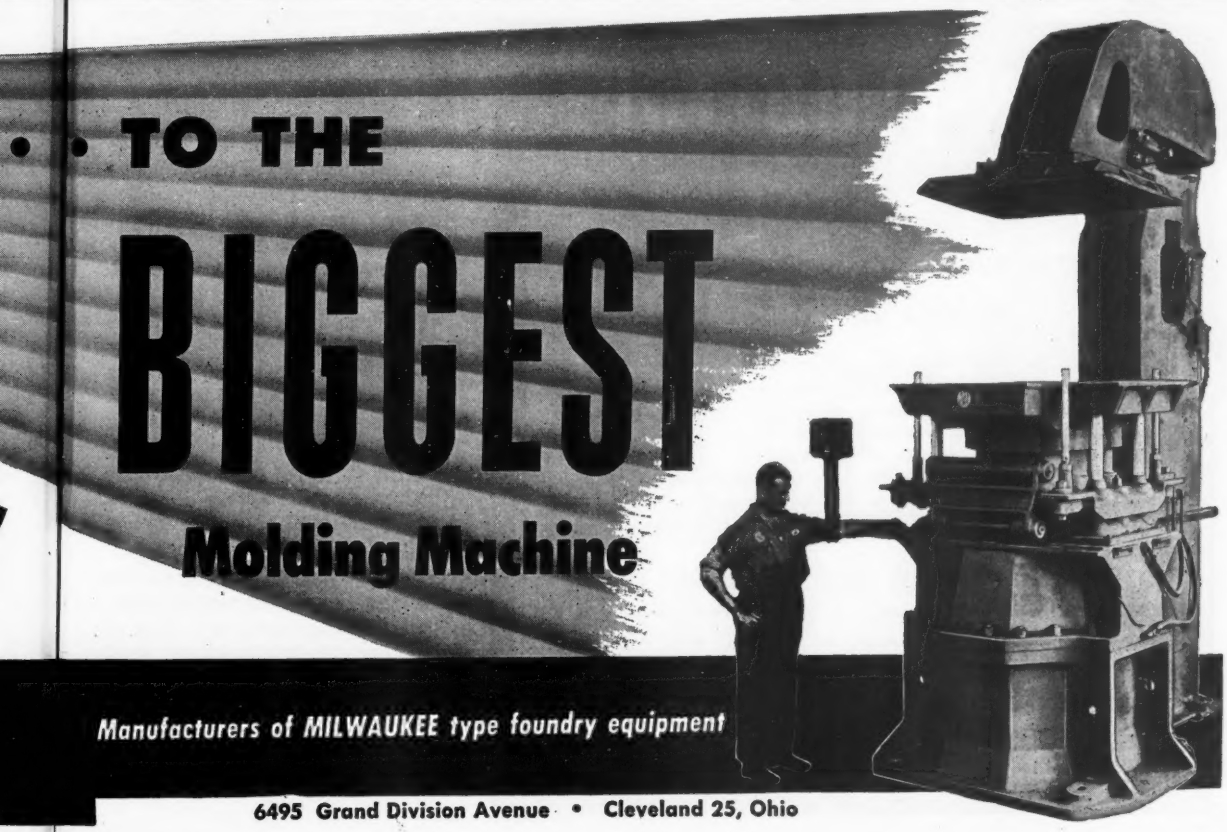
This summary is based principally on tests running 150 to 200 hours. It cannot be categorically applied to more extended time applications.

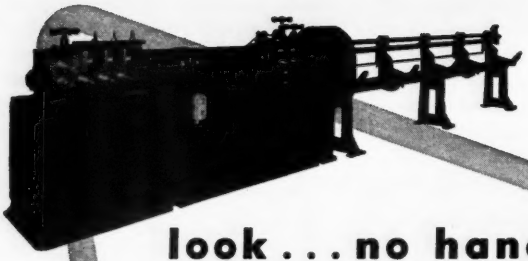
Metal or Alloy	Maximum Temperature
1010 steel	900° F
NAX series steels	1000° F
4340 steel	1100° F
430 chrome steel	1100° F
Timken steel	1300-1400° F
347 stainless	1700° F
304 stainless	1700° F
309 stainless	2000° F
310 stainless	2100° F
314 stainless	2100° F
446 stainless	2000° F
Inconel "C"	1500° F
Inconel "W" (heat treated)	1500° F

Constant heat application was made during the tests. The company suggests that, if heat application is intermittent, maximum temperatures listed should be reduced about 100° F.

Welding introduces additional considerations. To be on the safe side, the guide reports only Nos. 321 or 347 should be used when welding is done on the stainless steels. Both are stabilized alloys and can be used interchangeably. If a nonstabilized stainless is welded, high temperatures may cause failure at the weld area.

It also notes certain physical





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Capacity 3/8" to 11/16" round wire.

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Recommended For The Highest Speed Portable Electric Tools

NON-FLUID OIL has the "stay-ability" necessary for the constant dependable lubrication needed for gears and bearings operated at the high speeds of portable electric tools. NON-FLUID OIL keeps tools in steady service and does not separate under elevated temperatures and centrifugal force—thus holds down maintenance costs.

Write for free testing sample of NON-FLUID OIL stating the make and model of the portable tool in which it will be used.

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WAREHOUSES: Atlanta, Ga. • Birmingham, Ala. • Charlotte, N. C. • Chicago, Ill. Columbus, Ga. • Detroit, Mich. • Greensboro, N. C. • Greenville, S. C. • Providence, R. I. • St. Louis, Mo. Also represented in most other industrial centers, including Cleveland, Ohio • Cincinnati, Ohio • Pittsburgh, Pa. • Syracuse, N. Y.

NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture.

properties affected by high temperatures. Hardenability of certain of the metals and alloys used in the tests is materially affected by temperature applications that might occur during application of ceramic coatings or in high temperature use. That factor should be observed when considering base metals or alloys to be used for coatings.

New Chain Needs No Oil

Oil-impregnated sintered metal bushings opens up new fields for chain

LITTLE or no lubrication is required by a special roller chain developed by Whitney Chain Co., Hartford, Conn., after four years of research. Factor that eliminates the need of lubrication is the use of oil-impregnated sintered metal bushings.

Roller chain, for decades was recognized as one of the most efficient and versatile means of mechanical power transmission available to machine designers and production men. Up to now, the use of roller chain was limited under certain conditions, due to the need for either externally applied lubrication or totally enclosed lubrication.

Life Longer—Exhaustive laboratory tests and field installations of the new sintered bushing chain indicates a marked increase in service life on applications where normal lubrication is not available, the manufacturer says.

An insight into the possibilities of the new chain can be gained by the findings of a recent laboratory test. In this test, a ⅝-inch pitch oil-impregnated sintered bushing chain and a ⅝-inch pitch standard roller chain, prelubricated to the best practice, were installed on 19 and 45-tooth sprockets having a center distance of 8.75-inch.

The two chains were then run under a 10-hp load at 1900 rpm. The test is comparable to that of a motorcycle chain operating at 80 miles per hour, using full engine horsepower.

At the end of 20 hours operation, the standard, prelubricated roller chain showed wear or elongation of 0.380-inch. The oil-im-

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YALE WORKSAVER Electric Trucks are ideal where size and weight make big trucks impractical...over low-load floors; in freight elevators; railroad cars and trucks.

Industry prefers YALE WORKSAVERS because they offer big-truck efficiency for less cost, plus these big truck advantages: forward and reverse power travel...powerful hydraulic lift.

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*Heavy-duty platform Yale WORKSAVERS**

***Yale's Electric Hydraulic Powered Hand Truck**

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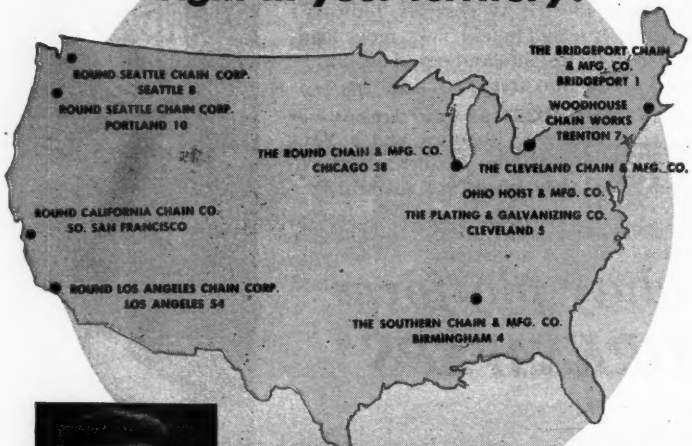
ROUND SEATTLE CHAIN CORP. SEATTLE 8
ROUND SEATTLE CHAIN CORP. PORTLAND 10
THE BRIDGEPORT CHAIN & MFG. CO. BRIDGEPORT 1
WOODHOUSE CHAIN WORKS TRENTON 7
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ROUND CALIFORNIA CHAIN CO. SO. SAN FRANCISCO
THE PLATING & GALVANIZING CO. CLEVELAND 5
ROUND LOS ANGELES CHAIN CORP. LOS ANGELES 54
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W. J. KEENAN

WOODHOUSE CHAIN WORKS—established in 1884—joined the nationwide Round organization in 1936. Under the management of Willis J. Keenan, who has been a Round Chain man for 15 years, Woodhouse now offers *a complete line* of welded and weldless chain, slings, chain hoists, electric hoists, trolleys and winches to the important Middle Atlantic market. *Sold exclusively through distributors and wholesalers.*

Chain for Every Need! Security in Every Link!
A COMPLETE LINE OF WELDED AND WELDLESS CHAIN
SLING CHAINS • LOG CHAINS • HOIST CHAINS
HOISTS • HOOKS • FITTINGS AND ATTACHMENTS
Round CHAIN COMPANIES
THE OLDEST NAME IN ROUND CHAIN

pregnated sintered bushing chain showed a wear or elongation of but 0.080-inch, indicating an increase of several hundred per cent in anticipated service life.

Opens New Fields—A chain possessing such marked advantages is expected to open up new fields of use for roller chains in areas restricted previously to other methods of power transmission. For example, chain drives are employed frequently in areas containing considerable grit or abrasive material. Under such conditions, chain drives are often operated without lubrication of any sort, as external oiling of the drive results in a materially decreased service life.

There are obviously, many applications in other industries requiring a chain that requires little if any lubrication due to other conditions.

Application of the new oil-impregnated sintered bushing chain will be subject to engineering approval by Whitney Chain. For the time being, production of the new sintered bushing chain will be limited and restricted to several sizes.

Car a Minute Unloaded

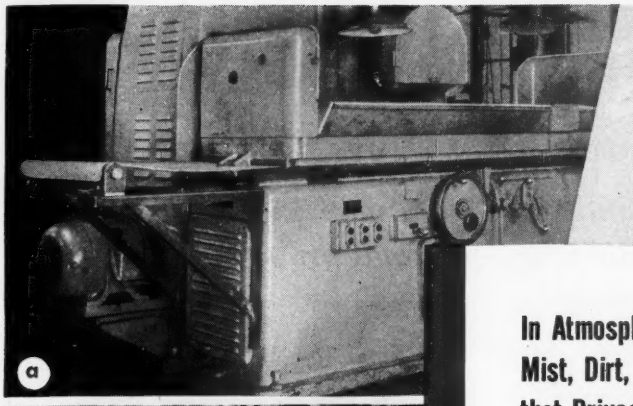
A NEW conveyor belt capable of unloading a full carload of coal in one minute has been installed by the Rail-T-Water Transfer Corp., Chicago, making it one of the fastest coal unloading installations in the world.

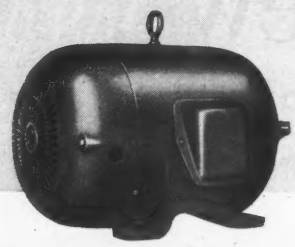
The belt is 72 inches wide and 942 feet long. It is designed to handle 3000 tons of coal per hour, an increase of 50 per cent over the 54-inch belt formerly used.

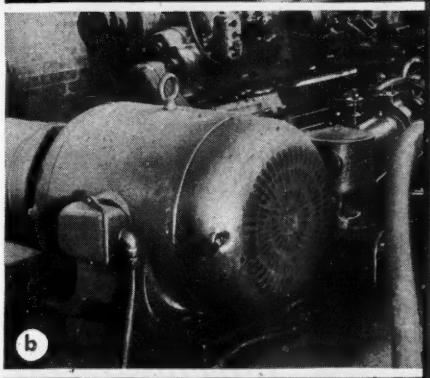
The increased capacity will result in a considerable saving of cost and it will speed up service for customers using the facility.

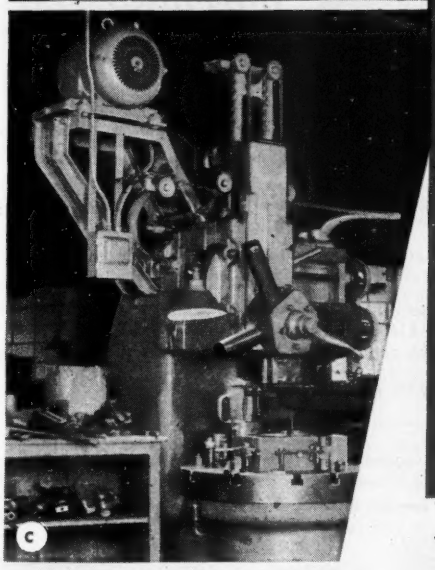
The belt, furnished by United States Rubber Co., is made of 7 plies of 42-ounce duck with a ¼-inch rubber cover on top and a 1/16-inch cover on the pulley side. It is believed to be the longest 72-inch conveyor belt in operation in the world. It is driven by a 350 horsepower motor and has an operating speed of 560 feet per minute.

Fed Faster—The new belt is fed by a five-car unloading facility compared with a two-car facility









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Totally Enclosed Fan Cooled Motors

In locations where the air is charged with substantial quantities of metallic or abrasive dusts, coolant mists or fog, or oil-laden factory dusts, Century Type TEFC Motors assure protection to help maintain uninterrupted production.

Because the vital parts of the motor are sealed in an inner frame, they are isolated from the outside atmosphere. A large fan blows cooling air between the inner and outer frames — keeps the motor temperature well within safe limits.

Wherever there are adverse atmospheric conditions, specify Century Totally Enclosed Fan Cooled motors, to give you the extra assurance that production will be maintained.

Other types and kinds of Century motors are built in sizes from ⅛ to 400 horsepower — designed to meet all popular industrial requirements.

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Century C MOTORS

(a) Surface grinder with Century 5 horsepower TEFC motor mounted near the floor.

(b) Century 15 horsepower TEFC motor operates in coolant fog from this grinder.

(c) Boring Mill with Century 5 horsepower TEFC motor.

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Squirrel Cage Induction—⅓ to 400 H.P.
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⅛ to 1½ H.P.

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AC to DC, AC to AC
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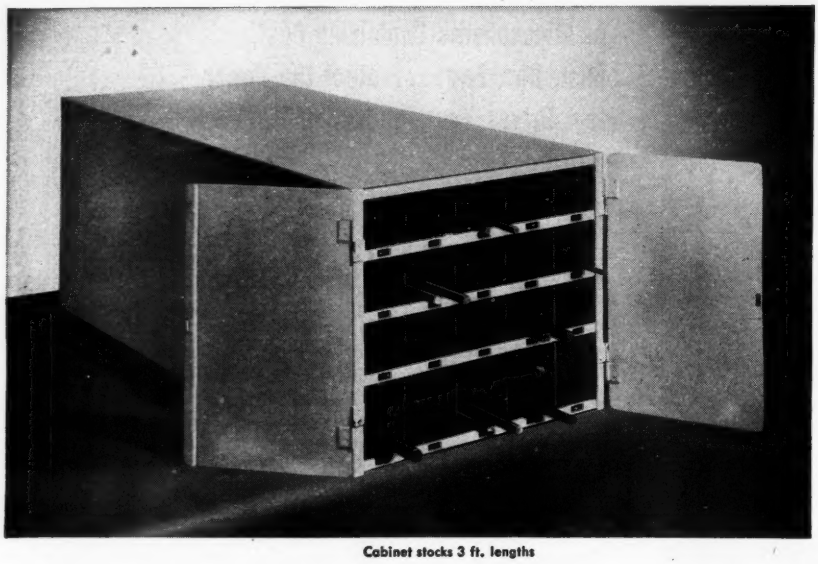
News! News! News!

FOR *ALL* METAL PRODUCTS MANUFACTURERS!

Here's* Sure Spec...*the finest quality drill rod money can buy...with a safe, sturdy steel cabinet to store and protect it!



Cabinet stocks 3 ft. lengths

Sure Spec drill rod is high grade tool steel — comes in manufacturers' standard sizes at low prices!

Rounds from .013" to 2"
Squares from 1/16" to 1"
Flats from 1/16" x 1/8" to 1/2" x 1"

SEE! *this easy purchase plan...*

This is no ordinary storage box. The cabinet is all steel outside and has removable steel partitions to provide various bin sizes. Bin floors are wood. Doors are equipped with hasp for padlock. Bins have slots at front for rod size tickets for easy selection and stock checking. Cabinet is painted an attractive orange inside and out, with black walls and floors for the bins. Stocks rounds, flats and special shapes up to 36" long in its 20 bins. Imprinted on the inside of the doors are fractional, decimal and weight equivalents of standard Sure Spec drill rod sizes.

***This safe, sturdy steel storage cabinet*, designed to protect your drill rod, is yours with one of these easy plans:**

1. You may purchase the cabinet alone for $24.95 f.o.b. Cleveland.
2. Or you may get the cabinet free with an initial order of $150 of Sure Spec drill rod.
3. Or you may get a $24.95 credit for the cabinet if you purchase $150 worth of Sure Spec Drill rod within a 90-day period.

Send your order today for plan 1, 2 or 3.

Or Write Today for comprehensive data book detailing all the facts about Sure Spec drill rod, such as sizes, analysis, uses and treating. Also, at your request, one of our sales engineers will call to discuss your particular drill rod requirements and quote prices.

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Thickness Insurance

X-ray gage controls thickness to within 0.001-inch in sheet brass, copper and commercial bronze rolled on a four-high mill by Chase Brass & Copper Co. at Waterbury, Conn. Operator watches dial to correct roll position when dial hand wavers, insuring uniform product by constant control

for the old belt. It was shipped by rail in two sections from the United States Rubber Co. plant in Passaic, N. J., and was made endless at the site by the company's mechanics.

The loading plant is located on the Calumet river at 101st street. Coal originating in Kentucky and southern Illinois is dumped into hoppers through a vibrating feeder, then it passes up the main belt to two short belts which feed a universal chute emptying into river boats.

Studless Lath Saves Steel

More and more architects are conserving steel by eliminating channel studs from 2-inch solid metal lath and plaster partitions thus saving up to 44 per cent by weight of the material.

Tests conducted by the Metal Lath Manufacturers Association prove that a studless partition retains the same rugged, crack-resistant properties of a metal lath partition with studs.

In recent months, the association says, this studless partition has been featured in some of the largest modern housing developments in the United States. Detroit's Douglas housing project and San

READ HOW YOU CAN CUT COSTS . . . SAVE MAN-HOURS WITH NOX-RUST'S NEW PATENTED VAPOR-WRAPPER METHOD OF RUST-PREVENTION

VAPOR-WRAPPER stops rust without oil or grease. This new paper contains a patented chemical that prevents corrosion. With Vapor-Wrapper, there's no greasing or de-greasing. You save time, man-hours and money when you switch to this better method of rust-prevention.

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Vapor-Wrapper delivers parts "factory-fresh"... ready for use. Your customers benefit... and you gain a real sales advantage with Nox-Rust Vapor-Wrapper. Find out for yourself. Get full details without obligation. Use the handy coupon below.

CAUTION... Only Nox-Rust makes the exclusive new Vapor-Wrapper that's impregnated with Cortex... the patented VOLATILE CORROSION INHIBITOR. (U. S. Patents 2,521,311—2,534,201 —other patents pending).

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FOLLANSBEE COLD ROLLED STRIP STEEL can be fed right from the coil into high-speed machines for fabricating most anything from funnels to furniture. Moreover, Follansbee Cold Rolled Strip is furnished in a wide variety of tempers and finishes to meet most demands.

For efficiency and economy in continuous operations, you'll find it worthwhile to try Follansbee Cold Rolled Strip Steels. All are supplied in coils for automatic productioneering, with mechanical and physical specifications to fit most needs. The Follansbee Steel Representative nearest you will give you full information.

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Follansbee Metal Warehouses—Pittsburgh, Pa., Rochester, N.Y., and Fairfield, Conn.

—Its Kicks Grow Weaker—

THE OLD "iron horse" is "dying", and the day may come soon when the steam locomotive is as out of date as the horse-drawn street car.

Back in 1929, railroads in the United States ordered 1055 steam locomotives and just 22 diesel-electric units. Twenty-three years later, in '51, the figures for steam were down to 22, diesel-orders rocketed to 4071.

Two material gentlemen largely are responsible for the predicament of the "iron horse"—Mr. *Simplicity* and Mr. *Dollar*.

Twenty-three thousand steam locomotives still remain in service on Class I roads, but diesels are handling 60 per cent of total passenger-locomotive mileage and 66.5 per cent of switching locomotive hours. Steam still handles half the freight mileage, but diesels are doing 53 per cent of the work on the basis of gross ton miles.

Francisco's multimillion dollar Park Merced project are good examples.

Contractors state that in addition to saving material costs, the studless partition is simpler to erect reducing labor costs.

Booster for Conveyors

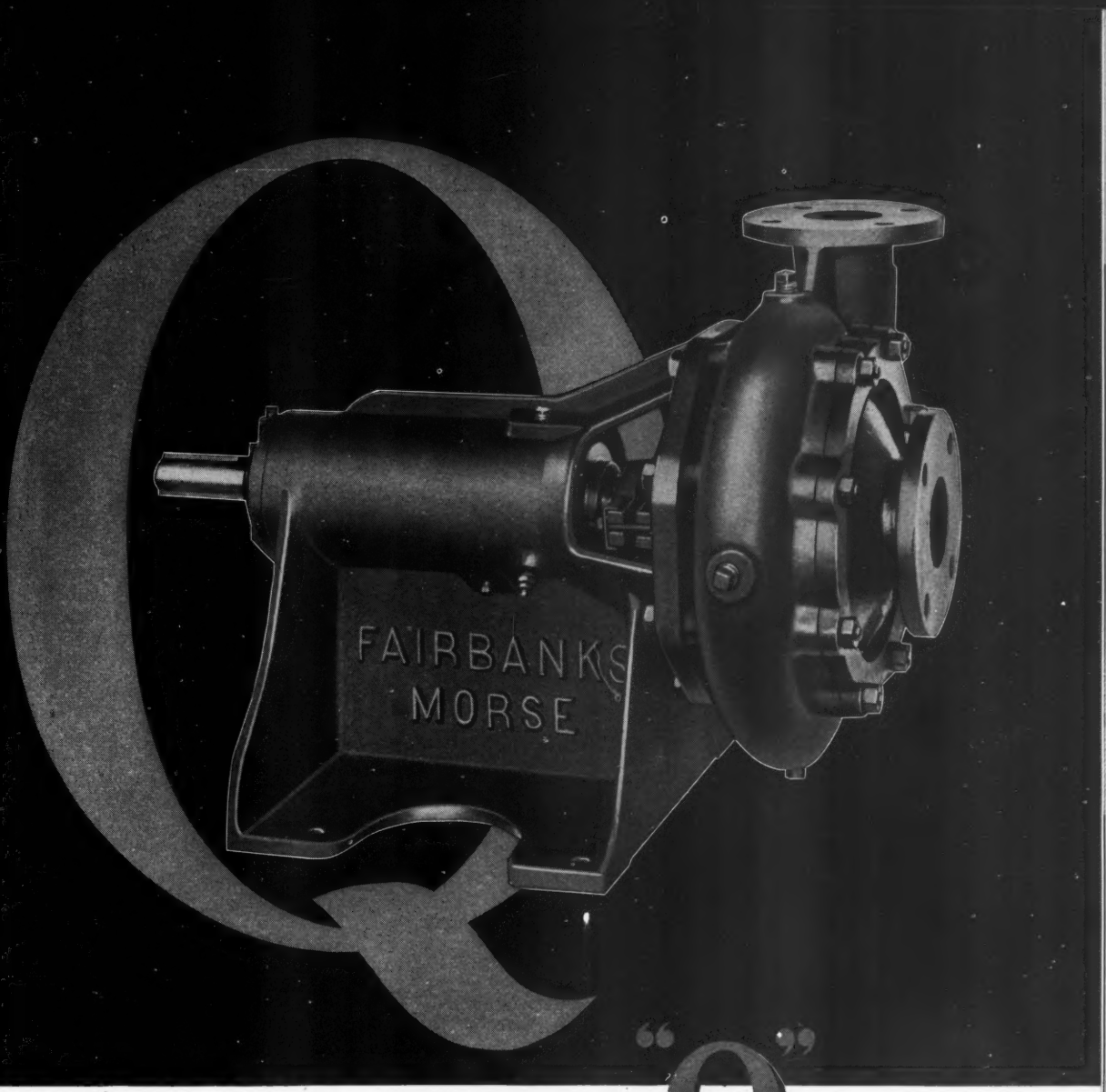
Power unit lifts assemblies from one level to another on a hand or gravity conveyor

CONSTANT, uniform flow of materials is sometimes unsuitable where independent handling of parts at certain points are required.

For movement from one operation or station to another, or where storage on the mechanical moving line is impractical, this problem can be solved by hand-pushed or gravity monorail systems.

Such gravity runs require a booster conveyor to elevate the loads from one level to another. One example is the booster unit made by the E. W. Buschman Co., Cincinnati, and installed at the Menasco Mfg. Co., Burbank, Calif.

Uphill Push — This monorail trolley carries aircraft landing gear assemblies. For a distance of 50 feet, and up a two degree



it's Your Q

Quality . . . that costs no more is yours when you choose Fairbanks-Morse Side Suction Centrifugal Pumps. Extensive engineering laboratories . . . production line methods with precision machining of all parts enable Fairbanks-Morse to offer you a side suction centrifugal with the design, workmanship and performance normally obtained only in highest quality split-case pumps.

Open type, single suction, high efficiency impeller . . . ball-bearing frame construction for long life and smooth operation . . . one-piece, solid cast frame . . . close-grained smooth cast iron volute . . . are among the many big pump features you'll find in these moderate priced side suction centrifugals.

For a "cue" to better pump performance, choose the pumps that spell quality with a capital "Q" . . . Fairbanks-Morse Side Suction Centrifugals. Fairbanks, Morse & Co., 600 S. Michigan, Chicago 5, Ill.

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a name worth remembering when you want the best

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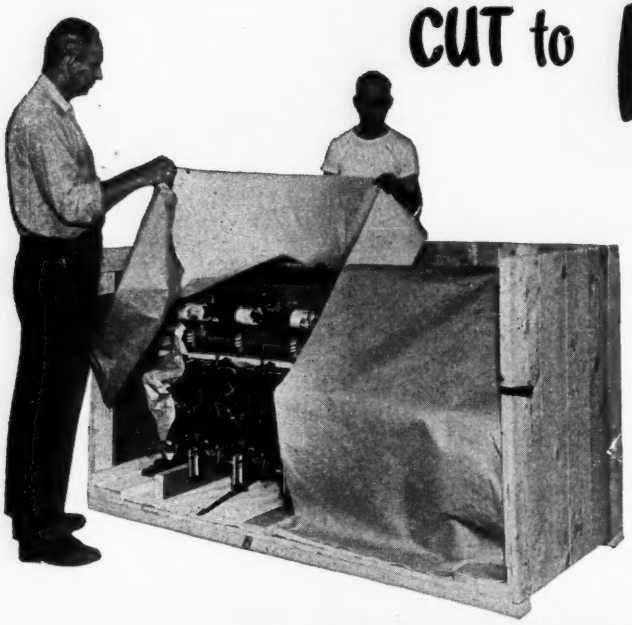
9 hour packaging job CUT to 1½



This Angier Paper STOPS RUST without Grease, Gunk or Goo

Think of your savings!

Here's an exporter who has *scrapped slushing* and all the mess that goes with it! When grease and oil were smeared over these intricate machines, packaging time was over 9 man-hours. Now only 1½ hours does it!

The answer is... Angier VPI* Wrap. This chemically coated paper gives off a vapor that *prevents rust!* If you ship or store metal products or parts, this clean and *proven* new way to stop rust is a cinch! Your customers, too, will be all for it because there's no "cleaning" to do. Get the facts now in "Applications of Angier VPI Wrap." It's FREE!

*T. M. Reg. U. S. Pat. Off. (Vapor Rust Preventive)

Angier CORPORATION Framingham 8, Mass.

Send "Applications of Angier VPI Wrap" as applied to rust control of:

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( ) Transportation Equipment—Aircraft, Auto, Naval, Railroad, etc.
( ) Steel in process of fabrication.
( ) Instruments and clocks.
( ) Ordnance Equipment.
( ) Others:

Welding Without Drilling

Firetube boiler output is up 25 per cent at the Emmaus, Pa., plant of Superior Combustion Industries Inc. The company adopted stud welding to break a bottleneck on cover assembly operations. Drilling was eliminated by use of the Nelson welding gun that attaches flux-filled, threaded studs

20 minute incline, the landing gear are boosted to the necessary elevation at a speed of 60 feet per minute.

Loaded carrier is automatically picked up by the cable conveyor pusher bar. Spaced at 10 feet assemblies arrive at the door of the adjacent building where sufficient acceleration at the discharge point gravitates carriers to final receiving point.

After removal of assemblies from monorail trolley the carrier is connected to the overhead cable conveyor and is returned to the starting point for reloading.

Metallurgists Meet in Tyrol

Several American and European physicists, chemists and powder metallurgists will meet June 22-26 at Reutte, the Tyrol, to participate in a metallics seminar. Responsible for the session is Dr. Paul Schwarzkopf, president of American Electro Metal Corp., New York, and owner of Metallwerk Plansee in Reutte.

List of the lecturers includes the following American metallurgists: Prof. G. J. Comstock and Dr. F. Clark, Stevens Institute of Technology, Hoboken, N. J.; Dr. H. H. Hausner, New York University,

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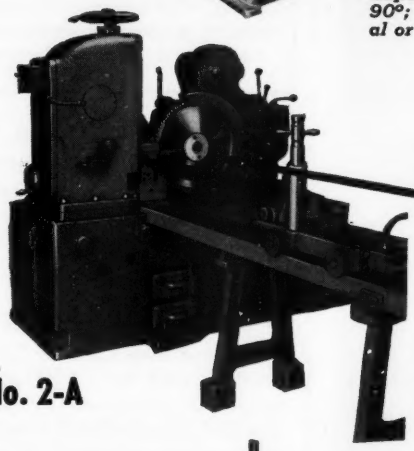
"It's the Cost per Cut that Counts!"

There's one economical way to cut off metal—by the Motch & Merryweather Triple-Chip Method. Speed, accuracy, square burrless ends, milled-finish pieces, — all contribute to profitable operation. Our wide experience in circular sawing covers all metals from magnesium to titanium. We are ready to demonstrate how the Triple-Chip Method will lower your costs.

No. 00-G

Material: S.A.E. 1020 tubing; 3" OD; .375 wall.
Production: 120 pieces per hour.
Tool Cost: $.0005 per piece.

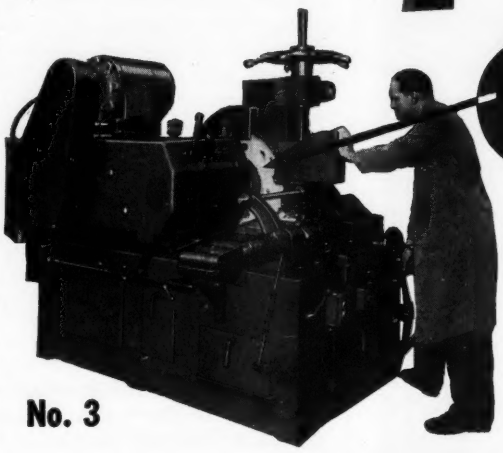
Capacity: up to 3" dia. at 90°; 2½" dia. at 45°. Manual or automatic stock feed.



No. 2-A

Material: S.A.E. 1020, 5" dia.
Production: 60 pieces per hour.
Tool Cost: $.001 per piece.

Capacity: up to 6½" dia., 6" square. Manual or automatic stock feed.



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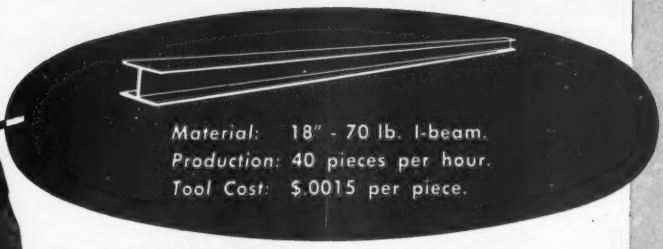

Material: 18" - 70 lb. I-beam.
Production: 40 pieces per hour.
Tool Cost: $.0015 per piece.

Capacity: 9⅝" dia., 6" x 18" rectangular shape. Manual or automatic stock feed.

Also 2 Still Larger Sizes:

No. 4 *Capacity:* up to 16½" dia.

No. 5 *Capacity:* up to 43" dia.

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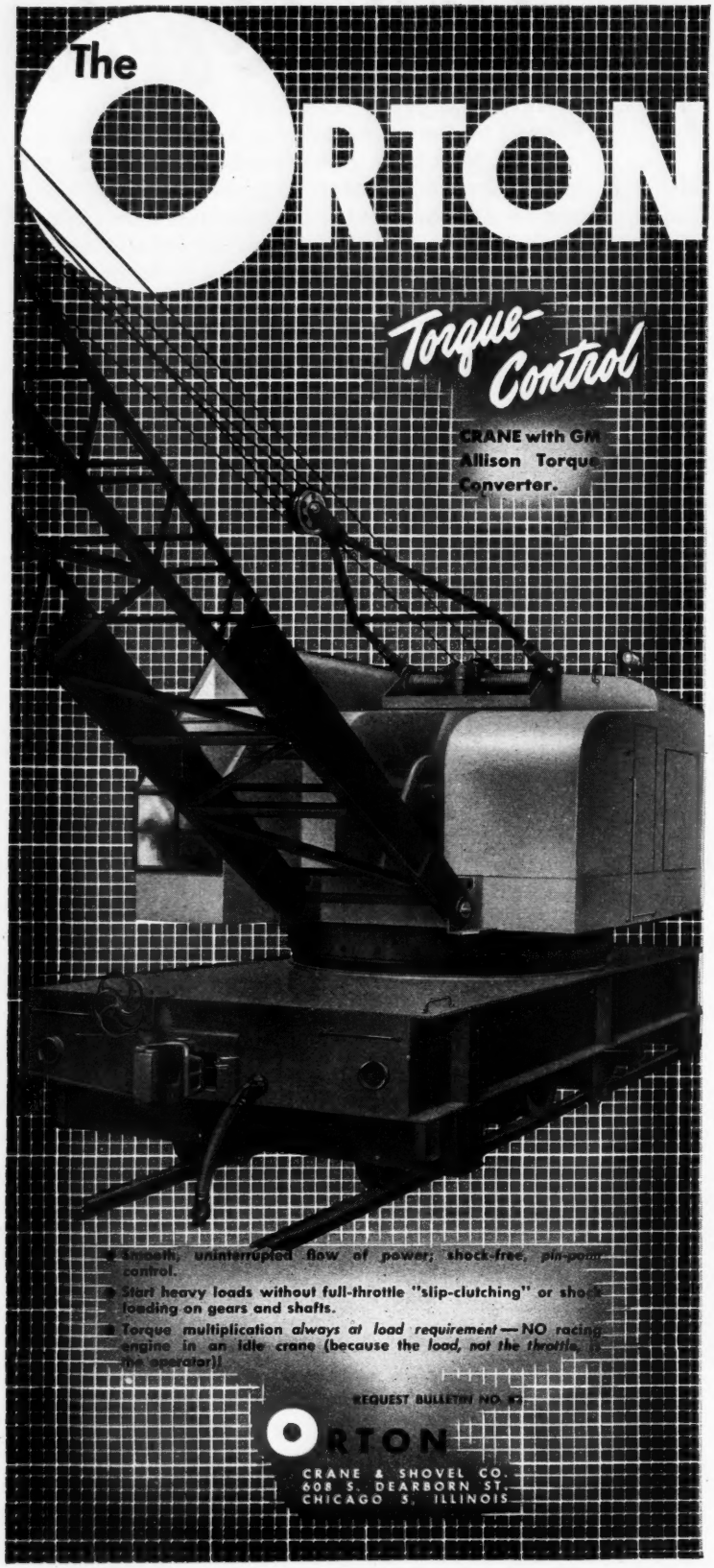
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Fast Fitting

ONE ANSWER to a maintenance man's prayer is a new stainless fitting reported by Cooper Alloy Foundry Co., Hillside, N. J. It joins pipe or tube without threading flaring, sweat soldering, brazing or weld.ng, saving time, labor and material.

All you do is cut the tube or pipe to length and deburr, then insert it in the fitting and complete the joint by tightening a small screw with a hex wrench. It is made in the form of elbows, Tees, couplings, reducers and adapters, and can be used w th less expensive light wall tubing.

In appearance, the new fittings resemble standard shapes with the addition of a clamp which is an integral part of each unit. Inside each is a synthetic sealing ring held in a groove machined into the bore of the fitting. This provides and maintains a squeeze fit within commercial tube or pipe tolerances.

New York; Dr. W. J. Kroll, Corvallis, Ore.; Dr. F. Lenel, Rensselaer Polytechnic Institute, Troy, N. Y.; and Dr. J. T. Norton, Massachusetts Institute of Technology, Cambridge, Mass.

Graphoid Film Cuts Galling

Aqueous dispersion of collodail graphite used as a parting compound is designed to prevent threaded pipe surfaces from rusting together or galling. After water carrier evaporates, graphite particles create a graphoid film with extremely low coefficient of friction. Film is unaffected by any temperature met in piping system.

Manufacturer, Acheson Colloids Co., Port Huron, Mich., calls its product Aquadag. Company reports application results in screw threads of studs and bolts being drawn tighter and with less effort.

Rims Changed on Belt Wheel

Reduction of wheel inventories, shortening of down time for repairing wheels and reduction of wheel costs are advantages of the "Rubber-Rim" wheel reported by Behr-Manning Corp., Troy, N. Y.

The abrasive belt contact wheel consists of two basic members. One is a steel rim onto which rubber

Lots of Welds

MORE THAN 30,000 electric spot welds are employed in each of the dirigible-shaped fuel tanks Ryan Aeronautical is building for the Air Force's B-47B bomber. All circumferential joints are closed with two rows of spot welds and one row of seam welding to attain a gas-tight seam.

The single longitudinal seam, which runs through the individual tank sections, is fusion welded on automatic Heliarc welding machines. This provides a strong, flat seam no thicker than the metal itself and does not require splice plates.

Giant spot welding machines used can squeeze aluminum alloy sheets together with 10,000 pounds pressure, and can produce more than 200 spot welds per minute, cramming nine of them into a running inch.

in durometers from 10 to 90 has been molded. The other is a set of flanges which contain the rubber rim.

Rubber face can be rapidly replaced with a new one should it be damaged or worn out. Due to the simplicity of replacing, wheel costs are less.

One version permits the interchange of various wheel widths by having a set of flanges and rims of various widths.

Screen Changed Faster

QUICK-CHANGE attachment now permits rapid changes of cloth on electrically heated screen installations. F. F. Hannon & Sons, Canton, O., the manufacturer, says it is applicable to all makes of screens on both new and existing electric screen heater installations used to eliminate blinding and speed screening of coal, ores, chemicals and other materials.

With the attachment, copper distribution bars are bolted to the skirtboard or side tensioning rail or under the cloth. They make positive, direct contact with the screen. Construction eliminates losses suffered when steel assemblies carry the current.

Attachment insures against weak or broken contacts due to rusting. It also shields the copper distribution bars against abrasion and permits use of full insulation to provide abrasion protection.

Preheater Starts Cold Engines

Engine preheating equipment developed by Stewart-Warner Corp. makes it possible to start diesel or gasoline engines under arctic conditions more quickly than was previously possible. Work on the equipment was done at South Wind Division, Indianapolis.

Report on the development is made by W. E. Judd, division sales manager. Mr. Judd says the product is adaptable for use on vehicles, on exposed shipboard diesels or on engine-driven generators or compressors.

Heating the engine interior—warming congealed oil on friction parts—is done by recirculating clean air heated to about 400° F. Tests show this type system makes cranking possible in some cases after 10-20 minutes heating time.

Lubricating oil can be preheated

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CLEAN BETTER, FASTER
WITH THE Clayton Hydro STEAM CLEANER

Quickly and easily connected to any ¾", 60 p.s.i. steam outlet, the portable Clayton Hydro Steam Cleaner provides a heavy-duty cleaning and sterilizing system. It employs steam to pick up, mix and deliver a driving spray of properly balanced cleaning or sterilizing solution at controlled pressures and temperatures. *Where it hits, it's clean.* The toughest cleaning job is completed more thoroughly in one quarter the time required by obsolete hand cleaning methods. Mail the coupon for a FREE, convincing demonstration in your own plant.

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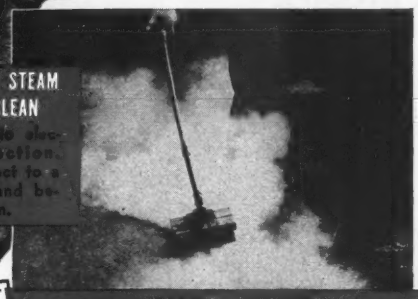
No wiring. No electric connection. Simply connect to a steam line and begin operation.



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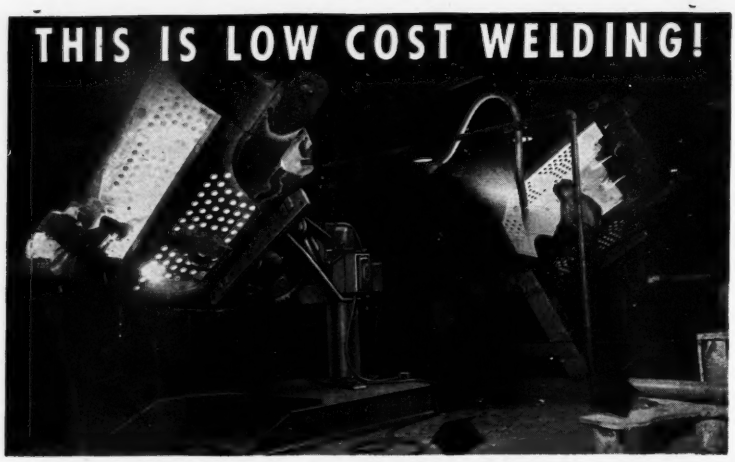
THIS IS LOW COST WELDING!



When a touch on a button moves weldments like these into the correct, most convenient position for a downhand pass, you get more arc time, more welding at lower cost. C-F power operated Positioners rotate the work in a full circle at any point in a range of 135° from the horizontal—giving welders a choice of an infinite number of downhand welding positions instantly.

Every requirement for faster, better positioned welding—constant or variable speed table rotation, full 135° tilt, self-locking gearing which holds the table in any position, oversize built-in main tilt and rotating bearings, choice of two base styles, and many other features—are built into C-F Positioners.

C-F Positioners are available in Hand or Power operated models, and are made in capacities up to 30,000 lbs. and larger.

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C-F positioned welds mean better, more economical welds

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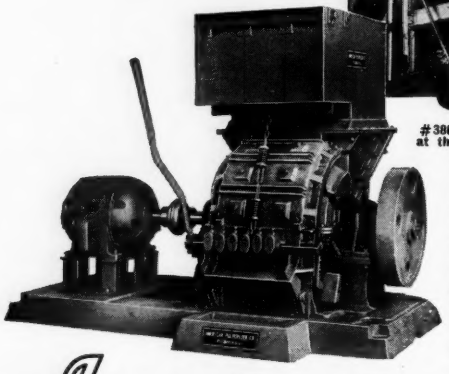
SOLVE SCRAP PROBLEMS PROFITABLY

with an

AMERICAN RING METAL TURNINGS CRUSHER

Metal turnings reduced to uniform chips by an American #3800 Crusher are collected for oil reclamation at the Link-Belt Co.'s Ewart Plant, Indianapolis.



Reduced into uniform chips by American shredder ring action, long, curly turnings of steel, aluminum, brass etc. release valuable cutting oil much more freely—30 to 50 gallons per ton! Add the savings in storage and handling—plus the higher scrap value of short shoveling turnings—and it's easy to see why Americans pay for themselves . . . over and over again.

Send for your copy of *"Metal Turnings Crushers" Bulletin*

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

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Short Order

One month passed between order and delivery of this 2925-pound all-welded steel pulley. Work was done at Link Belt Co.'s plant in San Franc'sco. Pulley is 84 inches diameter, designed to transmit 75-hp at 150-rpm. Rim was rolled from 1¼-inch plate; web, flame cut in two sections from ½-inch plate

by a heat exchanger built into or around the oil sump. One successful method employed by the company in its tests involves finned tubing routed through the oil sump, with air 400° F. Another approach has the combustion heater exhaust routed through the sump exchanger.

Graphitization Study Published

Graphitization encountered in high-temperature systems in power and processing industries is discussed in a 12-page booklet published by Edward Valves Inc., E. Chicago, Ind. Study describes the nature of graphitization, its effects and lists preventive and corrective measures.

Separate sections cover effect of chemical composition, deoxidation practice, prewelding microstructure, welding conditions, stress and strain.

Illustrations include photomicrographs of metallurgical specimens that show the graphitization process. Eutectic diagrams and graphs demonstrate effect of temperature, time and other variables on graphitization.

Copies of the study can be obtained by writing to the company, Department GA.

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Speed and Precision

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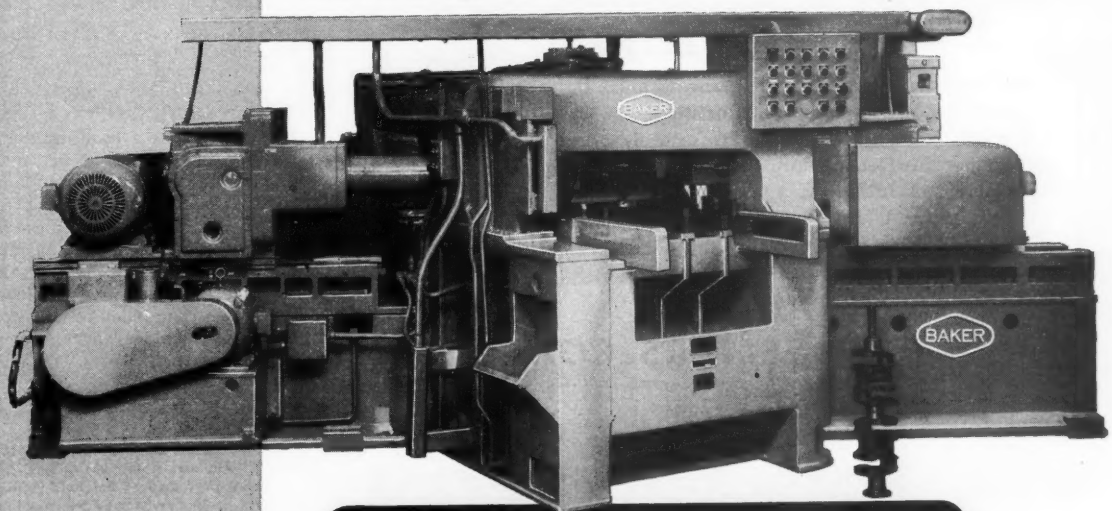
SPECIAL MACHINES

Precision productivity is the "watchword" with industry today, which makes BAKER special machines a necessity to keeping up production schedules and reducing part costs per man hour. The machine illustrated is a Baker four-station automatic transfer type machine for drilling 1" diameter lightning holes through crank pin bearings. Utilizing two standard Baker 7½ x 16 horizontal hydraulic feed saddle type drilling units, the Baker is capable of a production rate of 43.8 pieces per hour at 100% efficiency. Outside hydraulic pump sump units furnish hydraulic power for the two 7½ x 16 drilling units. The machine is a four-station, automatic transfer machine. Whatever your drilling problem, consult Baker engineers regarding a Baker special machine that will give you increased productivity at lower cost per man hour.



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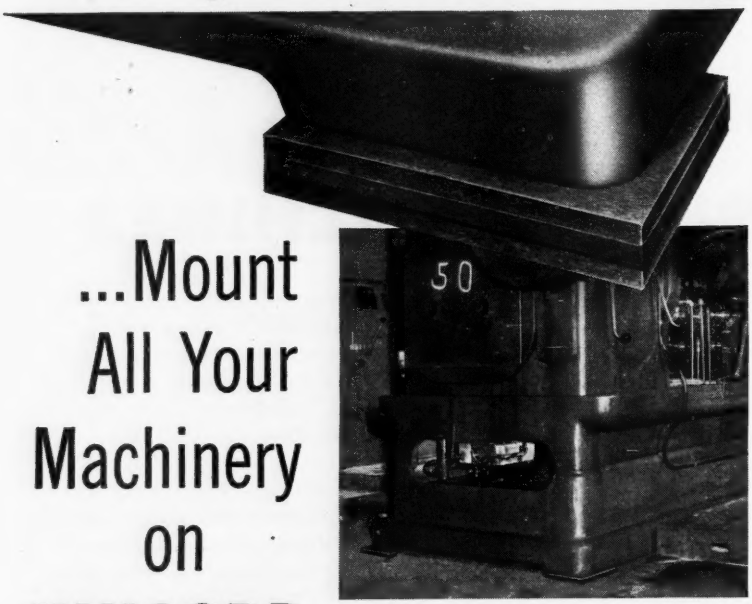
DRILLING . . . TAPPING . . . KEYSEATING and CONTOUR GRINDING MACHINES

Do Away With Costly Floor Drilling



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Cone Automatic Screw Machine mounted on UNISORB at the huge new Utica, N.Y., plant of Chicago Pneumatic Tool Company. UNISORB machine mounting is used throughout this exceptionally modern factory . . . can be used with any kind of machinery in *your* plant, on any kind of flooring.

UNISORB machine mounting means no more bolts or lag screws, no more costly, destructive floor drilling.

A special cement (we supply it) securely bonds the UNISORB pads to machine feet and floor with a holding strength of 90 pounds per square inch *minimum.*

What's more, UNISORB eliminates 60-85% of all transmitted machine vibration and noise: gives you longer machine life, less maintenance time and expense, added protection for building and floors, improved worker morale.

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New Books

Metals: Past, Present, Future

STORY OF METALS, by John W. W. Sullivan; cloth, 290 pages, 5 x 7½ inches; published jointly by American Society for Metals, Cleveland, O., and Iowa State College Press, Ames, Iowa, for $3; available from STEEL, Penton Bldg., Cleveland 13, O.

In an easy-to-read style, the author presents the story of metals from their origin to the present day. He begins with the evolution of the earth and the formation of mineral and metal deposits. He discusses the Stone Age, native metals, castings and man-made metals. Then came the art of alloying and the Bronze Age. During the next era, the Iron Age, we find iron smelting, early steelmaking and iron forging.

Metallurgical developments from 1500 to 1800 and the continued march of science bring the reader up to the development of modern iron and steel. The story continues with developments in copper, zinc, lead, tin, aluminum, magnesium, nickel, chromium, tungsten and titanium. The concluding chapter discusses the future of metals—the selective uses; powder metallurgy; sun, wind and metals; cosmic steels from synthetic atoms.

Technical terms are explained in an easily understood manner in the glossary. An index concludes the book.

Handbook on Combustion

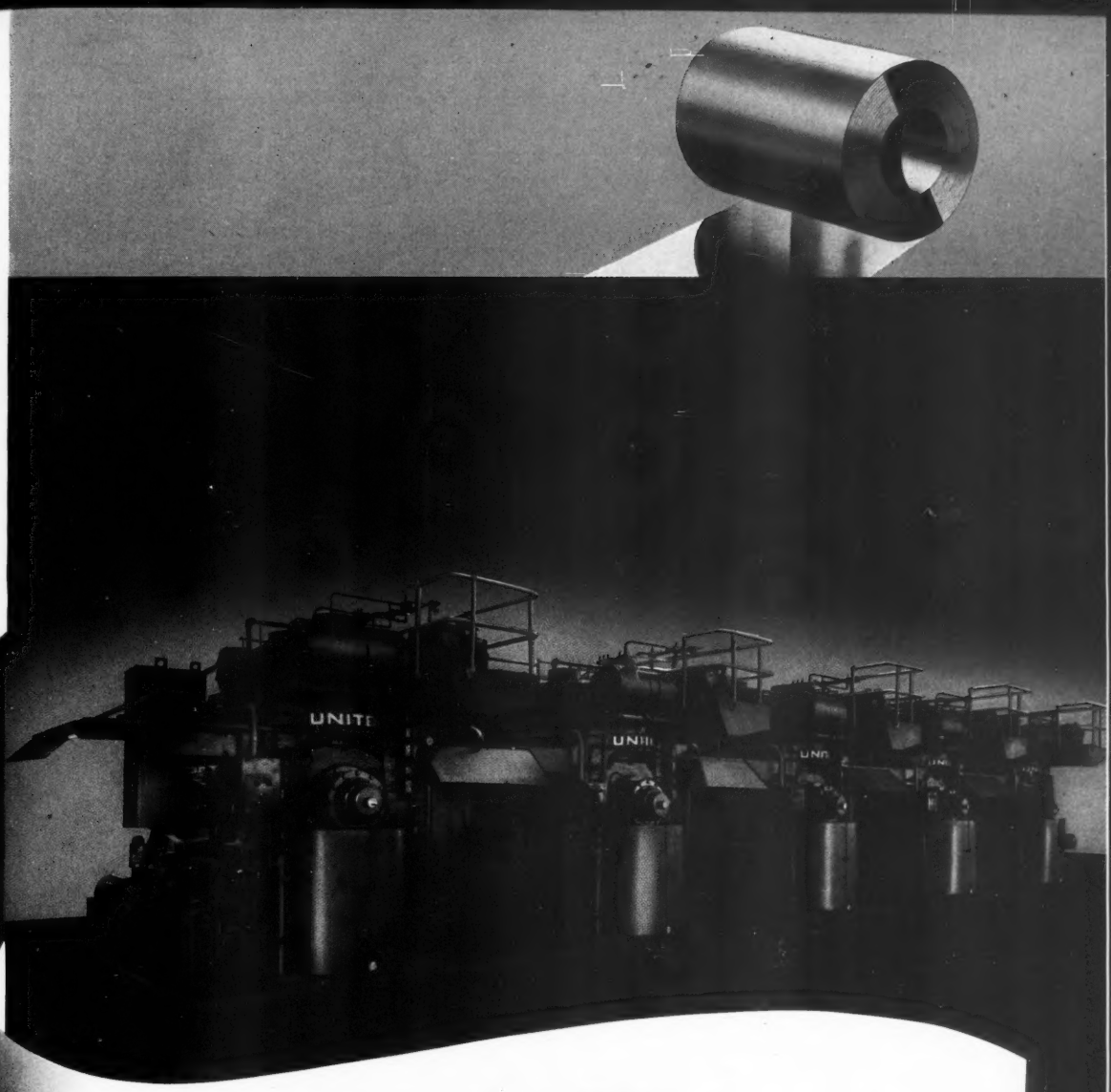
NORTH AMERICAN COMBUSTION HANDBOOK; cloth, 322 pages, 6 x 9 inches; published by North American Mfg. Co., Cleveland, O., for $2.00; available from STEEL, Penton Bldg., Cleveland 13, O.

This handbook is a basic reference on the art and science of industrial heating with gaseous and liquid fuels. It gives a basic explanation of the theory of combustion; outlines for combustion, heat transfer and fluid flow calculations; and a discussion of combustion equipment, its selection and operation. The index covers glossary, appendix, tables and charts as well as text matter.

Radiographic Testing

PRACTICAL RADIOGRAPHY FOR INDUSTRY, by H. R. Clauser; cloth, 301 pages, 5½ x 9 inches; published by Reinhold Publishing Corp., New York, for $7.50; available from STEEL, Penton Bldg., Cleveland 13, O.

Practical how-to-do-it approach to radiographic testing and inspection makes this book understandable to those with little or no training in physics or mathematics. The many illustrations include sample radio-



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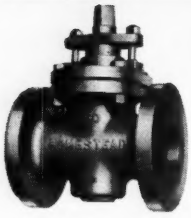
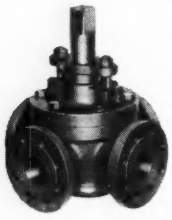
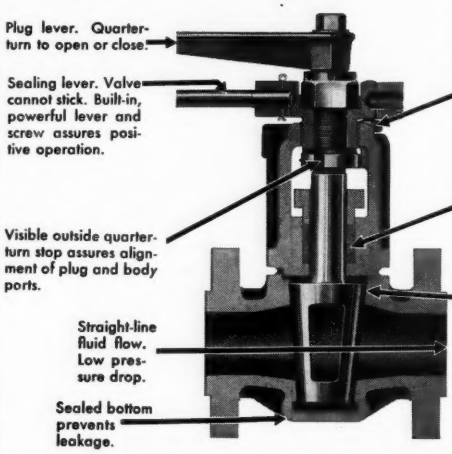


Straight-way—
Flanged or Screw Ends

Three-way—
Screw or Flanged Ends



Four-way—
Flanged or Screw Ends


Plug lever. Quarter-turn to open or close.
Sealing lever. Valve cannot stick. Built-in, powerful lever and screw assures positive operation.
Visible outside quarter-turn stop assures alignment of plug and body ports.
Straight-line fluid flow. Low pressure drop.
Sealed bottom prevents leakage.
Positive stop allows seating pressure to be relieved only enough to overcome friction between plug and body and permit easy turning of the plug.
Deep stuffing box and gland. No leakage
"Lever-seald" action presses mated metal surfaces firmly together to form perfect seal against leakage.
Protected seating surfaces. No fluid or grit passes across seating surfaces. Maximum valve life and lowest cost-per-year service.

Sectional View — Homestead Lever-Seald Valve — Closed Position

Straight-way— Flanged or Screw Ends

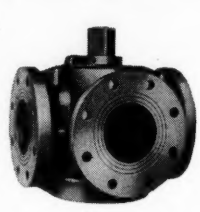
Three-way— Flanged or Screw Ends

Four-way— Flanged or Screw Ends

HOMESTEAD-REISER (lubricated)

Straight-way—
Screw or Flanged Ends

Straight-way—
Worm & Gear Operated



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Non-lubricated

You can end valve-operating difficulties on high temperature, pressure and corrosive services, and on jobs where lubricant would contaminate process fluids, by installing Homestead Lever-Seald Valves. They are stick-proof, because a *built-in* lever and screw device assures positive action at all times, under all conditions. If the service warrants, they may be double-sealed by pressure gun lubrication.

Homestead Lever-Seald Valves are available in straight-way, three-way, and four-way types, with screwed or flanged connections. They may be cast in Semi-Steel, Steel, Ni-Resist, Stainless Steel, Monel, or other alloys; in sizes from 1" to 10"; for vacuum to 1500 lbs., and for temperatures from 40° below zero to 1100°F. For full information, write for Valve Reference Book No. 39-3. No obligation.

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graphs showing actual defects in metal parts. Detailed information is given on setup procedures, exposure factors and techniques, radiograph quality, films and film processing. Also included is a complete coverage of radiograph interpretation, identification of defects and discontinuities in various materials and discussions of applicable standards.

Other chapters discuss radiography with radium and Cobalt 60, fluoroscopy and miscellaneous applications including recent advances such as radiation detectors, microradiography and thickness gaging methods.

Bolt, Nut, Rivet Information

BOLT, NUT AND RIVET STANDARDS, flexible cover, 255 pages, 5½ x 8¼ inches; published by Industrial Fasteners Institute, Cleveland 15, O., for $3.00; available from STEEL, Penton Bldg., Cleveland 13, O.

This completely revised and enlarged book replaces the first edition of the standards that was issued in 1941. It contains all current standards for commercial fasteners. It aids production in manufacturers' plants and provides a service to users in acquainting them with accepted standards of nomenclature, dimensions, sizes and other practices.

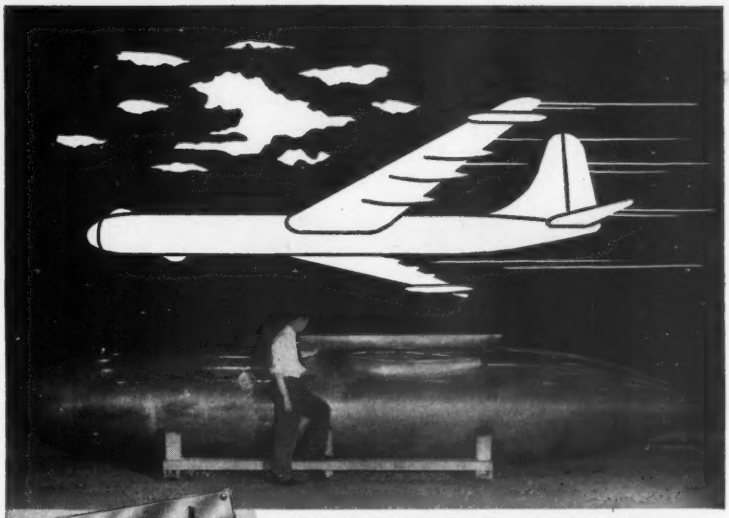
Among the new standards included in this edition are those for round head bolts (carriage bolts), plow bolts, track bolts, studs, slotted and recessed screws, socket head screws, small solid rivets, large rivets, unified screw threads. Also included is a section listing weights and stock production sizes and informative discussions on screw threads, gaging practices, fastener materials, manufacturing processes and a complete list of all recognized fastener specifications.

Nationalization in Britain

BRITISH PLANNING AND NATIONALIZATION, by Ben W. Lewis; cloth, 313 pages, 5½ x 8½ inches; published Twentieth Century Fund, New York, for $3.00; available from STEEL, Penton Bldg., Cleveland 13, O.

A number of selected areas in which, since 1945, the Labor government of Great Britain has undertaken positively to control the economic life of the nation is explored in this book. The first chapter discusses the way in which Britain's formal economic planning machinery operates. Following chapters deal with nationalization, town and country planning, distribution of industry, national health service, housing and agriculture.

The author, a professor of economics at Oberlin College, bases his report on first-hand observation and study during a reconnaisance trip to Great Britain and careful examination of published material.

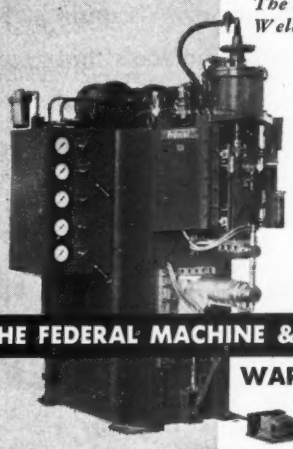


Federal RESISTANCE WELDERS USED IN CONSTRUCTION OF LARGEST KNOWN FUEL TANK

The huge external aircraft fuel tank pictured above is one of a type being produced for the Air Forces by the Ryan Aeronautical Company. Designed by Ryan the tanks are fabricated of aluminum alloys, seam welded to MIL-W-6860 (AN-W-30) on Federal Welders where Ryan is making gas-tight seams without the use of sealing compounds.

Federal Resistance Welding equipment enables Ryan to produce a smoothly streamlined tank that has no external riveting or protuberances to disturb the aerodynamic flow over the skin. Too, resistance welding the tanks eliminates added weight.

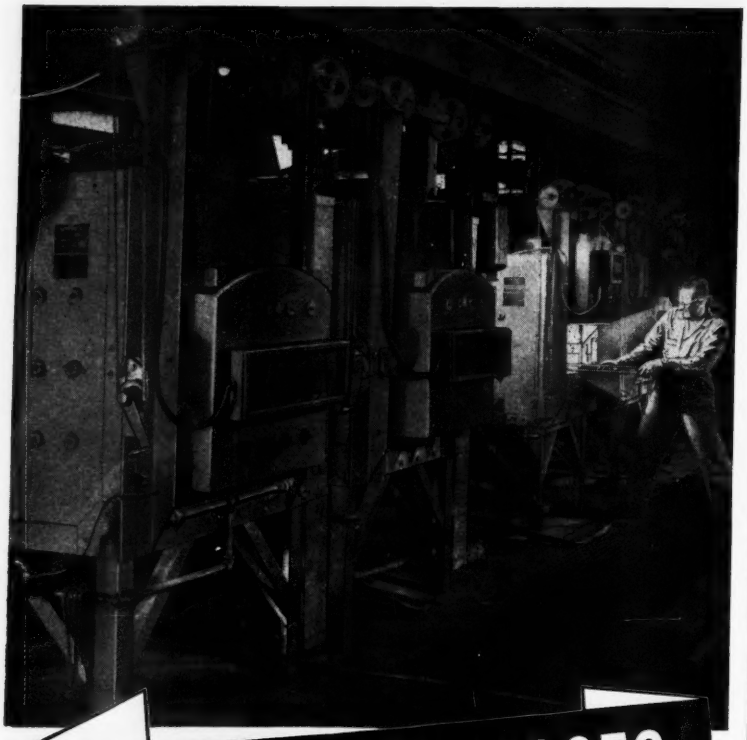
High production is another important factor and Ryan, like other aircraft and automotive manufacturers, finds Federal Resistance Welders the most efficient method for producing quality assemblies at high speeds.



The latest Federal Three-Phase Aircraft Spot Welder for welding stainless, aluminum, nickel alloys and carbon steels. If you are interested in Three-Phase Resistance Welding be sure to talk with the Federal Representative in your area. There's a reason why Federal is First in Resistance Welding. Send for your copy of the latest Federal Three-Phase Bulletin.

THE FEDERAL MACHINE & WELDER CO.
WARREN, OHIO

Federal® WELDERS
Warco PRESSES®



HEVI DUTY FURNACES
In Tool Room Service

Are Versatile . . . . .
and Dependable

● These Hevi Duty Box Furnaces at the A. O. Smith Corp. of Milwaukee, Wisconsin are used for hardening production tools that vary in weight from a few ounces to several hundred pounds. Hevi Duty Furnaces provide the uniform temperatures needed for precision heat treating.

Send for bulletins HD-341 and HD-441

HEVI DUTY ELECTRIC COMPANY
HEAT TREATING FURNACES HEVI-DUTY ELECTRIC EXCLUSIVELY
DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS
MILWAUKEE 1, WISCONSIN

CALENDAR
OF MEETINGS

June 15-18, National Association of Cost Accountants: Annual international cost conference, Waldorf-Astoria Hotel, New York. Association address: 505 Park Ave., New York 22. Secretary: A. B. Gunnarson.

June 15-19, American Society of Mechanical Engineers: Semi-annual meeting, Sheraton-Gibson Hotel, Cincinnati. Society address: 29 W. 39th St., New York 18. Secretary: C. E. Davies.

June 16-17, Malleable Founders Society: Annual meeting, The Homestead, Hot Springs, Va. Society address: 1800 Union Commerce Bldg., Cleveland. Secretary: Lowell D. Ryan.

June 16-20, American Electroplaters Society: Annual meeting and industrial finishing exposition, Hotel Conrad Hilton and International Amphitheatre, Chicago. Society address: Box 168, Jenkintown, Pa. Secretary: D. Gardner Foulke.

June 19-20, American Management Association: General management conference, Waldorf-Astoria Hotel, New York. Association address: 330 W. 42nd St., New York.

June 19-21, American Society of Mechanical Engineers: Applied Mechanics Division conference, Pennsylvania State College, State College, Pa.

June 22-24, Alloy Casting Institute: Annual meeting, The Homestead, Hot Springs, Va. Institute address: 32 Third Ave., Mineola, N. Y. Secretary: E. A. Schoefer.

June 23-26, Radio-Television Manufacturers Association: Annual convention, Palmer House, Chicago. Association address: 777 14th St. NW, Washington 5. Secretary: James D. Secrest.

June 23-27, American Institute of Electrical Engineers: Summer general meeting, Hotel Nicollet, Minneapolis. Institute address: 33 W. 39th St., New York 18. Secretary: H. H. Henline.

June 23-27, American Society for Testing Materials: 50th anniversary meeting and exhibit, Hotels Statler and New Yorker, New York. Society address: 1916 Race St., Philadelphia. Secretary: C. L. Warwick.

June 23-27, American Society of Mechanical Engineers: Oil & Gas Power Division conference, Hotel Statler, Buffalo, N. Y.

June 26-28, American Society of Mechanical Engineers: Western meeting, Applied Mechanics Division, University of California, Los Angeles. Information director: J. C. Dillon, Engineering Extension, University of California.

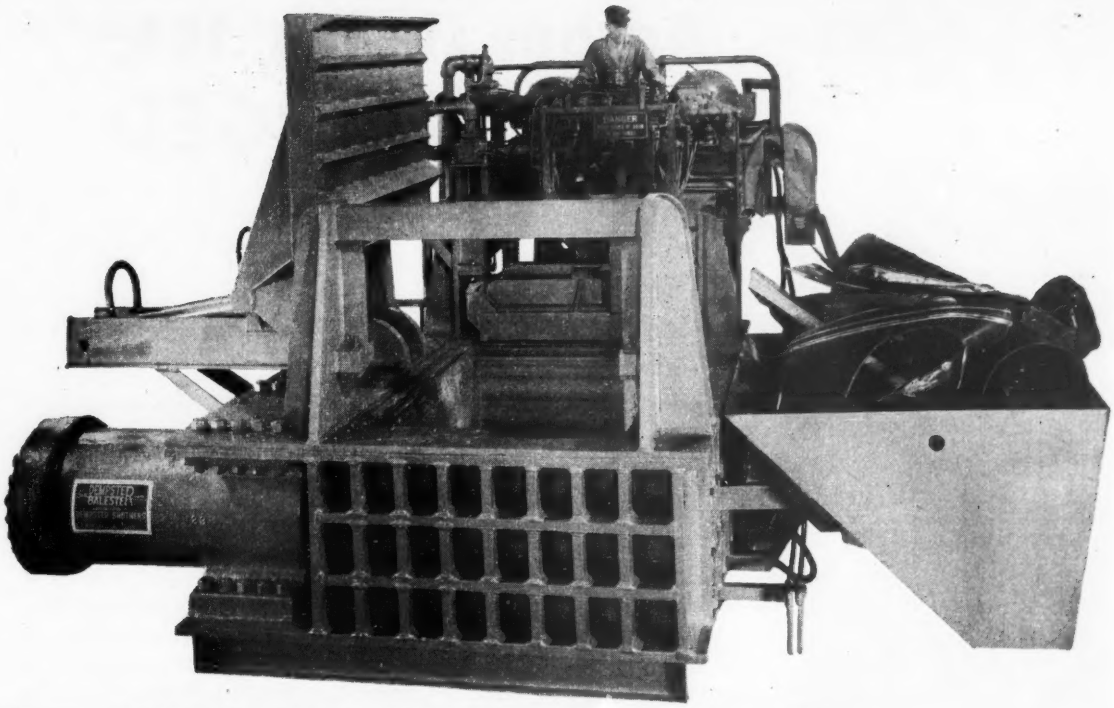
June 29-July 2, National Industrial Advertisers Association: Annual meeting, Palmer House, Chicago. Association address: 1776 Broadway, New York. Executive secretary: Blaine G. Wiley.

June 29-July 2, Caster & Floor Truck Manufacturers Association: Joint material handling, industrial meeting, Grand Hotel, Mackinac Island, Mich. Association address: 7 W. Madison St., Chicago 2. Secretary: Harry P. Dolan.

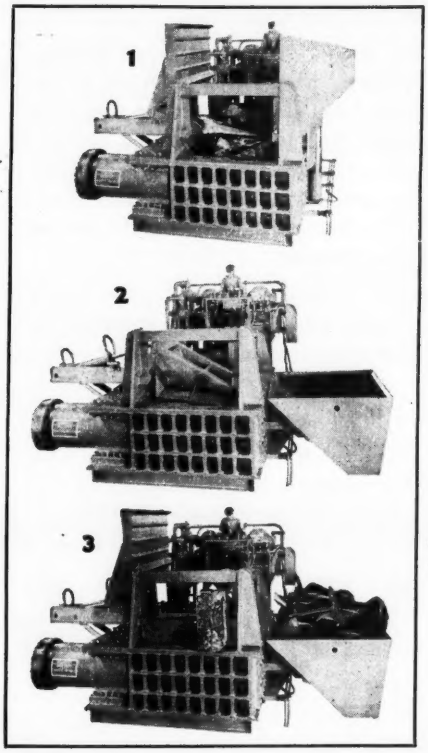
June 30-July 2, Materials Handling Institute: Annual meeting, Grand Hotel, Mackinac Island, Mich. Institute address: 731-732 DuPont Circle Bldg., Washington 6. Managing director: R. Kennedy Hanson.

Air Shipping Aid Offered

Aid to manufacturers who ship by air is a revised edition of the data book, "How to Ship by Air in Corrugated Boxes," published by Hinde & Dauch Paper Co., Sandusky, O. Revision records information on proper use of air-express, freight and parcel post, citing current regulations in accordance with recent postal changes.



The DEMPSTER-BALESTER gives you the nearest thing to Automatic Baling!



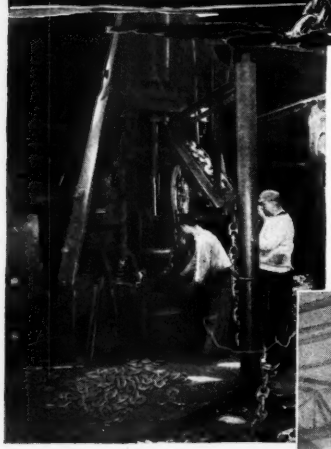
The Dempster-Balester, with Auxiliary Compression Door and Skip-Pan Loader combination, offers you the nearest thing available to automatic baling. Every phase in the baling cycle is operated by hydraulic controls from the moment scrap metal is dumped into the Skip-Pan Loader until the finished bale is ejected.

Large photo above shows the big capacity Dempster-Balester Model "600" with Skip-Pan loaded. The three phases in the continuous baling operation are shown at left. 1—Skip-Pan dumps scrap into charging box. 2—Auxiliary Compression Door compresses scrap with a 45-ton force while Skip-Pan returns for re-loading. 3—Compression Door completes compression cycle. Charging box door closes and scrap is baled. Finished bale is ejected and Skip-Pan is ready to dump another load into charging box.

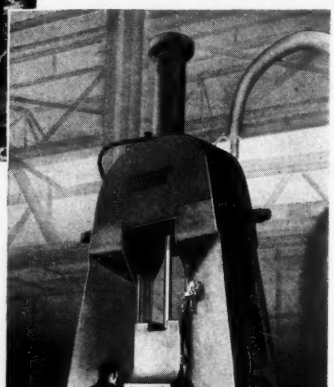
This Dempster-Balester "600" turns out 8 to 9 tons of baled scrap per hour with the Auxiliary Compression Door and Skip-Pan Loader combination. The door completely eliminates in some operations, and materially reduces in others, the costly process of tying up two or three extra men as arrangers. For complete information on how to bale your scrap at lowest cost, write to us today! A product of Dempster Brothers, Inc.

DEMPSTER BROTHERS, 662 Dempster Bldg., Knoxville 17, Tenn.

Anchor Chains, too, are FORGED



The anchor chain of the S.S. "United States" was made by the Baldt Anchor Chain and Forge Division of the Boston Metals Co., by the "Di-Lok" method—the only chain making process that can be called 100% forged. Chambersburg Steam Drop Hammers are used to forge the male link of the chain. The female link is then drop-forged around the serrated stems of the male link, each link being "laced" through the last link made and forged under the hammer, until a full 15 fathom (90 foot) length is completed.



WHEN the great S.S. "UNITED STATES", new and majestic queen of the United States Lines, leaves on her maiden voyage on July 3rd, 1952, she will be carrying on a great tradition of American shipbuilding. A tradition that reaches back across the years to that other "United States", Commodore Stephen Decatur's sturdy frigate, which defeated the British "Macedonian" in the War of 1812.

Shipbuilding, like most other industries, has changed greatly in the past 140 years, yet in one respect, the two "United States" are akin—they both rely on anchor chains to keep them on their moorings.

But the anchor chain of the modern "United States" has a virtue unknown to the early bluejackets. Each link is drop-forged—under Chambersburg Hammers—a process that gives enormous strength, together with toughness and ductility to absorb the tremendous strains and shocks to which anchor chains are subjected.

For impact forging gives maximum tensile and torsional strength, with concentration of grain structure at points of greatest shock and strain, and high resistance to fatigue.

There is no substitute for "impact" forging.

CHAMBERSBURG ENGINEERING CO.
Chambersburg, Penna.

CHAMBERSBURG
THE HAMMER BUILDERS

NBS Length Standards Available

ULTIMATE STANDARDS of length, available to science and industry, are reported by National Bureau of Standards and Atomic Energy Commission.

Standards consist of spectroscopic lamps containing a single pure isotope of mercury. These lamps enable any research organization that has auxiliary optical equipment to have an ultimate primary standard of length in its own laboratories.

Distribution of the lamps will be handled by the bureau. They will be available to qualified government, industrial and educational laboratories in this country and abroad.

Transmutation of Gold—Lamps were prepared under direction of Dr. W. F. Meggers, chief of the NBS spectroscopy laboratory. They contain about one milligram of mercury, of atomic weight 198. Mercury 198 is obtained by the transmutation of gold in a nuclear chain-reacting pile.

Mercury 198 is sealed in a small glass tube and caused to glow brightly by application of high frequency radio waves. Light waves emitted by the single isotope have sharply defined wavelengths that can be used for length measurements of great precision. These particular waves are uniquely characteristic of the mercury and remain unaltered with time.

Green Light—New standard is based on the wavelength of the green light emitted by the lamp. This wavelength, near 21-millionths-inch, is consistently emitted with a reproducibility greater than one part in a billion. Length measurements based upon it can readily be made with an accuracy of one part in 100 million.

However, the world's official primary standard of length is still the distance between two lines on a metal bar. But practically all precise measurements of length in the 20th century have been made and will continue to be made with light waves.

Red Light—Up to the present, wavelength of red light from cadmium has been used as a wavelength standard. In 1927, International Conference of Weights and Measures provisionally adopted the value 1,553,163.13 wavelengths of cadmium red radiation as equal to 1 meter. In 1948 the NBS proposed that the meter be defined in terms of the radiation from mercury 198. This is now under consideration.

Fundamental advantage of mercury over cadmium is that the wavelengths of light from mercury are much more sharply defined. Cadmium consists of six principal isotopes that are not separated. They emit light of slightly different wavelengths.

Other Advantages—Mercury has other advantages: Atoms are heavier, move about more slowly and disturb the wavelength less. Light can be obtained without heating the mercury to a high temperature and thereby speeding up the atomic motion. Lamp life appears to be infinite. A lamp under continuous excitation since October, 1949—more than 10,000 hours—has shown no significant deterioration.

IT'S YOURS—FREE

IT SUMMARIZES THE LATEST ADVANCES IN MODERN CLEANING & PROCESSING FOR THE METAL INDUSTRIES — THE FOLLOWING ARE A FEW EXAMPLES:

- How to get fine-grain phosphatizing in one to two minutes, without stainless steel equipment, rinsing or chromic acid dips . . . using KELITE KEYKOTE.
- How to remove heat treat scale by simple immersion . . . using KELITE SCALE-OFF.
- How to remove grease and carbon . . . from any metal . . . by immersion at room temperature in an odorless, non-inflammable, non-phenolic liquid . . . KELITE FORMULA 555.
- How to prepare diecast parts for plating . . . eliminating "spotting out" . . . by direct and reverse current . . . with KELITE FORMULA 45.
- How to remove fibre greases and polymerized oils from steel . . . by hot tank immersion . . . in as little as four hours . . . using heavy-duty KELITE HD7.
- How to handle 23 other difficult cleaning or processing jobs with literally hundreds of applications in every phase of the metal finishing and metal working industries.

SEND THE COUPON BELOW FOR YOUR FREE COPY OF THIS MODERN SUMMARY!

KELITE
REG. U.S. PAT. OFF.

1250 NORTH MAIN STREET, LOS ANGELES 12, CALIFORNIA

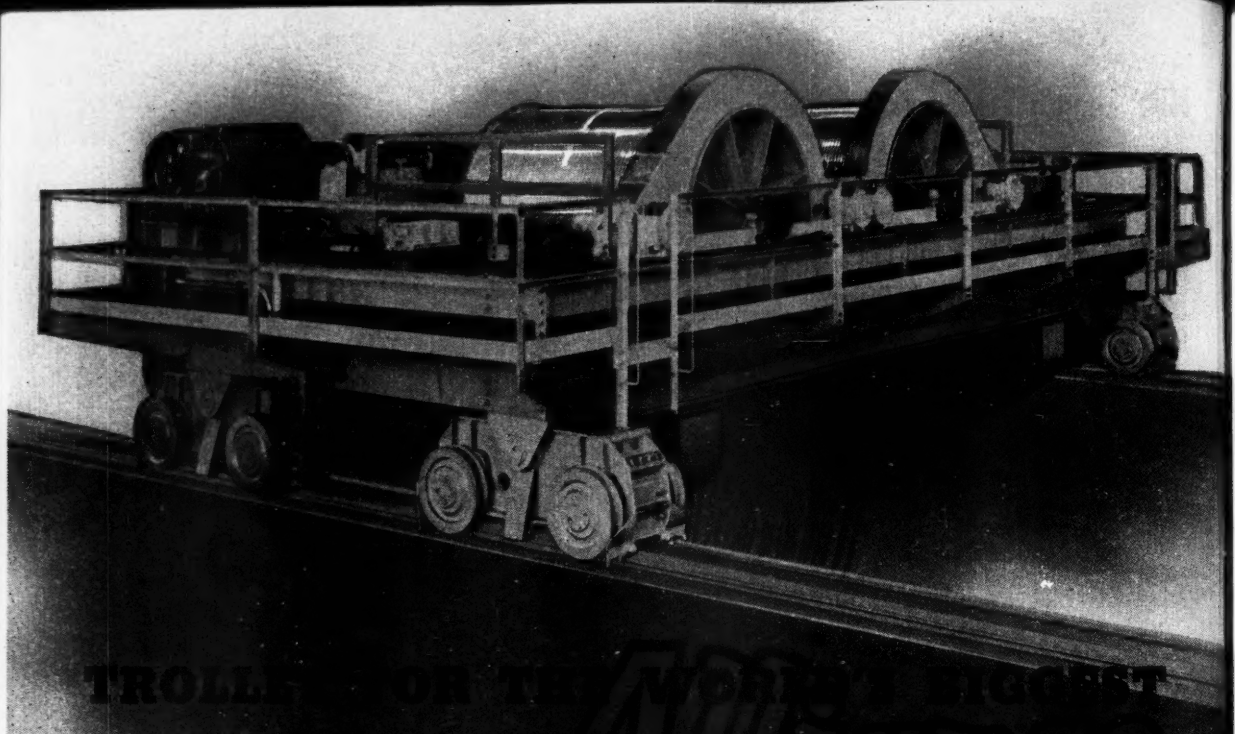
Gentlemen: Without cost or obligation, please send me a copy of Kelite Bulletin 121.

Name_____

Company_____

Street_____

City_____ Zone_____ State_____



TROLLEY ON THE MODERN CRANE BY Alliance

Paul Bunyan used to brag about threading a needle with his enormous hands . . . but he has little on Alliance trolleys. Swiftly, but with the accuracy and control of a micrometer, the world's largest crane moves tons of molten steel with utmost safety.

The trolley is equipped with 16 double-flange track wheels which operate on rails at 30" centers. These wheels are compensated for longitudinal and transverse equalization which assures equal loading of all wheels. The rails being located over the web plates prevent flexing and cracking of top cover plate and reduces the number of diaphragms required.

This ladle crane trolley is equipped with a two-motor, synchronized worm drive, interlocked double-drum type main hoist. The synchronizing shaft employed in this scheme of gearing not only eliminates the undesirable ratchet gears but makes possible an additional safety feature in case one of the hoist motors fail. Under this condition both worms are driven by the remaining motor and all gearing functions as with two motors. In case of failure of one hoist motor on the conventional drive without the synchronizing shaft, hoisting is accomplished by only one set of gears. This imposes a double load on active gearing, the second drum being driven through the interlocking drum gears. The hoist gearing is so proportioned on all ladle cranes that the full capacity of the crane can be lifted by one motor without exceeding the quarter-hour rating.

The drum gears and pinions of the main hoist of this new crane have precision-cut, single-helical teeth, and in cooperation with the worm drive, assure vibrationless operation on either high or low speed hoisting and lowering.

All gears are fully enclosed and operate in a bath of oil, assuring long life and low maintenance.

This trolley is designed for maximum accessibility and ease of maintenance. Anti-friction bearings throughout.

The 4-part safety rope system installed on this crane affords the highest degree of safety in rope reeving.

Contact Alliance today. At your convenience a qualified engineer will discuss your heavy material handling problems. It's to your advantage.

LADLE CRANES • GANTRY CRANES • FORGING MANIPULATORS • SOAKING PIT CRANES • STRIPPER CRANES • SLAB AND BILLET CHARGING MACHINES • OPEN HEARTH CHARGING MACHINES • SPECIAL MILL MACHINERY • STRUCTURAL FABRICATION

THE

Alliance

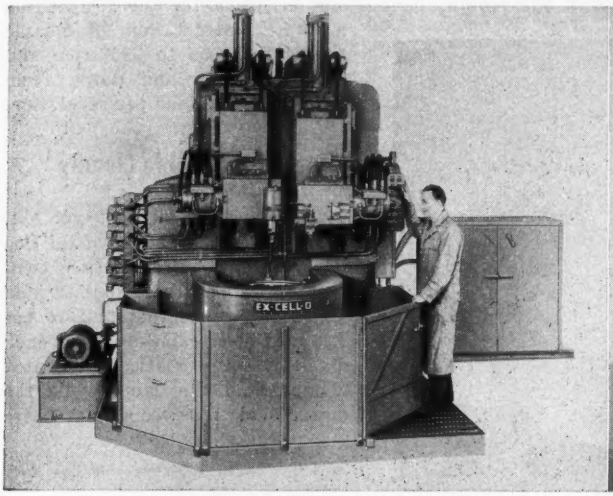
MACHINE COMPANY

World's largest builders of world's largest cranes

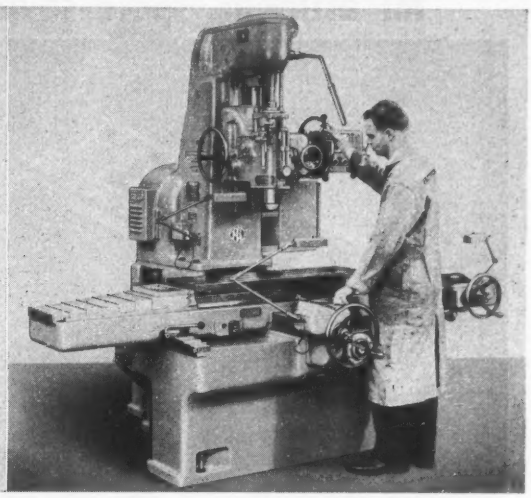
MAIN OFFICE
ALLIANCE, OHIO

PITTSBURGH OFFICE
1622 OLIVER BUILDING • PITTSBURGH, PA.

New Products and Equipment



MULTIPLE BORING, TURNING, FACING TOOL
. . . sufficiently rugged to perform semifinishing operations



ACCURACY IN HIGH-SPEED OPERATION
. . . provides precision locating, drilling and boring

Vertical Boring Machine

USE REPLY CARD—CIRCLE No. 1

Multiple precision boring, turning and facing operations can be performed on an automatic vertical precision boring machine announced by Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Called style 425, the machine is sufficiently rugged for semifinishing work. Operations can be performed in a choice of automatic cycles that include automatic changes in work spindle speeds. Heavy cast iron base supports a column on which two counterweighted and hydraulically-operated vertical slides are mounted.

Table is 36 inches diameter, supported on a vertical spindle. This spindle is mounted in 24-inch taper roller bearings and driven through a precision worm at speeds to 500 rpm. This range includes speeds high enough to machine aluminum efficiently. Machine's applications include multiple finishing operations on large wheels for jet aircraft engine compressors.

Welding Line Introduced

USE REPLY CARD—CIRCLE No. 2

Line of portable heavy-duty welding and brazing units is announced by Generator Sales Co., 1627 N. Damen Ave., Chicago 47, Ill. Tools have built-in power equipment for grinding, buffing, polishing, sanding, brushing or sawing. Equipment includes a General Electric Co. motor generator with self-sealed ball bearings, and standard accessories such as buffing and wire brush wheels, grinding disk, single-groove v-pulley 1½ inches diameter, etc.

Model 2-A operates on 110 v, 60-cycle ac or dc. Speeds range from 2000 to 10,000 rpm; amperage rating is 0 to 150. Welder has eight ranges, welding a maximum ½-inch steel and taking a maximum 5/32-inch rod.

Gage Inspects Small Bores

USE REPLY CARD—CIRCLE No. 3

Dial bore gage designed to inspect small diameter bores from 0.250 to 0.375-inch is a development of Standard Gage Co. Inc., Poughkeepsie, N. Y. Called model 00, the gage checks tolerances to 0.005-inch. It employs interchangeable centering-size disks, attached firmly to the head of the instrument by a knurled clamping nut. Disks can be interchanged quickly for dimension changes by simply turning the clamping nut. Dial indictor has high visibility graduations of 0.0001-inch. Plunger actuating the indicator is sapphire tipped; centering-size disks are chromium plated to assure long wear life.

Borer Works Small Jobs

USE REPLY CARD—CIRCLE No. 4

Small-size jig borer, second model in a series featuring the Electrolimit measuring system, is announced by Pratt & Whitney Division, Niles-Bement-Pond Co., W. Hartford 1, Conn. This model, called No. 1E, is designed for precision locating, drilling and high-speed boring in small work. Company reports improvements over its previous types include heavier and wider bed construction, addition of table and carriage way telescoping guards, redesigned quill mounting and a central control.

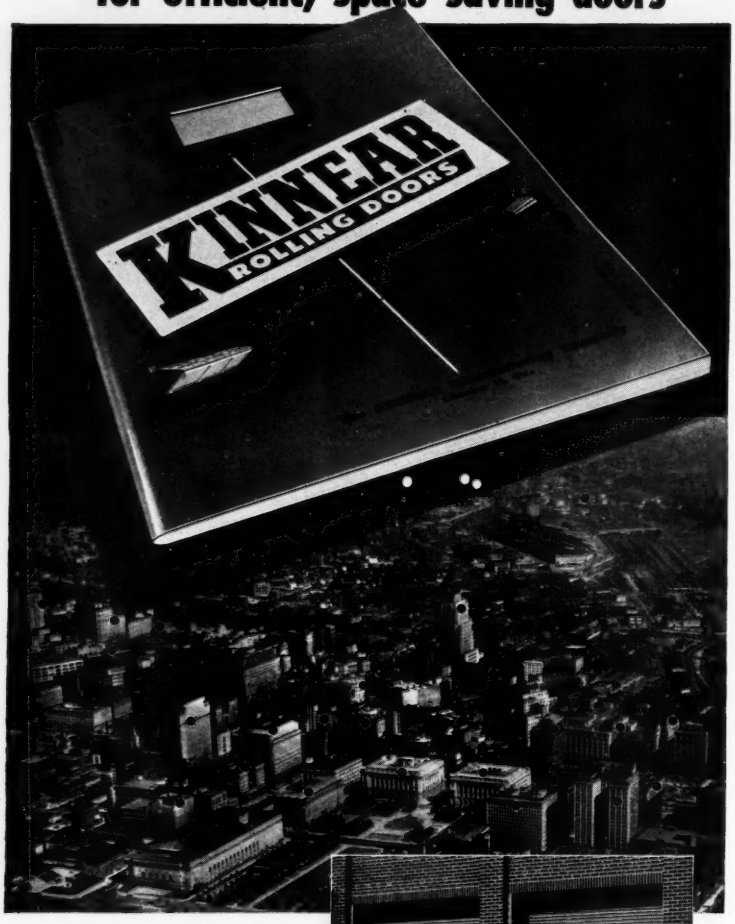
Measuring system permits rapid table settings accurate to 0.0002-inch. Two measuring units, entirely independent of transversing screws, control longitudinal and transverse settings. Basic 1-inch settings are obtained electromagnetically from a solid master bar

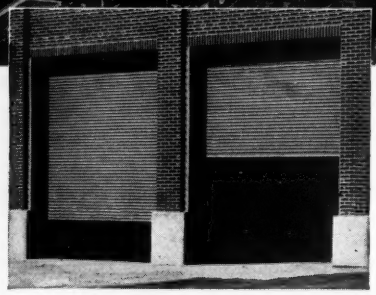
REPLY CARDS

on page 191 will bring you more information on any new products and equipment in this section.

COVERS EVERY NEED

for efficient, space-saving doors





Cost-Cutting Doors for All Types of Buildings Shown in New Kinnear Catalog

Above is a typical city and some of its many different buildings equipped with Kinnear Rolling doors. In similar industrial, commercial and public buildings *throughout the world*, the famous interlocking steel-slat door (originated by Kinnear) has proved its many advantages. Coiling out of the way with smooth, vertical action, it offers maximum efficiency, protection, long service life and low maintenance. Users have found this increasingly true through more than half a century. Your free copy of this new catalog will give you latest, complete details on Kinnear Rolling Doors. Send for it today!

The KINNEAR Manufacturing Company

FACTORIES
1780-1800 Fields Avenue
Columbus 16, Ohio
1742 Yosemite Ave.
San Francisco 24, Calif.
Offices and Agents in Principal Cities

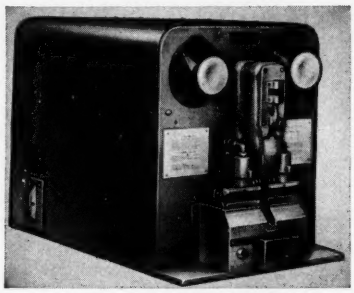
SAVING WAYS in DOORWAYS
KINNEAR ROLLING DOORS

and registered visibly by a zero reading on an indicating meter. Spindle quill mounting is designed to maintain its original rigidity and accuracy for the life of the machine. Model has 16 spindle speeds from 65 to 2800-rpm and four feeds, up and down, from 0.0006 to 0.006-inch per revolution.

Cutter Shears Cable Cleanly

USE REPLY CARD—CIRCLE No. 5

Cable cutting machine, type A-1, made by James L. Entwistle Co., Providence, R. I., employs a combination air-operated cutter and an assistance heating unit to cut stranded steel cable up to ¼-inch diameter. Pneumatically-operated clamps hold the cable while the cutter blade removes a slug. These



. . . assures accuracy on medium size work

clamps also serve as electrical contacts for passing low voltage-high current through the cable and at the same time stretch the piece at the cutting point.

Entire automatic operation takes 3 seconds after cable is positioned and the starter pressed. Sheared cable ends are slightly necked down, making insertion into cable terminals easier. Close length tolerances can be maintained because ends are uniform and square after shearing.

Potential Transformer Line

USE REPLY CARD—CIRCLE No. 6

Improved line of indoor and outdoor potential transformers in the 2400-v class is announced by Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 30, Pa. Vacuum dried and impregnated crepe paper insulation has high impulse and dielectric strength and low insulation power factor. Units are available in 45 or 60-kv full-wave impulse test level. They meet 0.3W, 0.3X,

"no more GAMBLING on tool steel selection"

[⅓ actual size; Selector is in 3 colors]

That's what one of the thousands of pleased users says about his CRUCIBLE TOOL STEEL SELECTOR, the new, simple, handy method of picking the right steel, *right* from the start. Since Crucible announced this Selector two years ago, thousands of tool steel users have received their Selectors . . . and here's what some of them say—

"Handiest selector I've ever seen!"

"Saves me time and headaches"

"It's so logical—you begin with the application".

You can be sure the answer you get with your Crucible Tool Steel Selector will be just right in every case, for this Selector covers 22 tool steels which fit 98% of all tool steel applications. And when—with a flip of the round dial—you get the answer, you'll get the steel FAST, too, because all the tool steels on the Selector are right in stock, in all our 26 conveniently-located warehouses.

This Selector is bound to be a big help to you—so write for yours today. There is no obligation whatsoever. Just fill in the coupon and mail now . . . before you turn this page and forget! CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, New York.

Here's how it works:

To use the Selector, all you need know is the characteristics that come with the job: type and condition of material to be worked, the number of pieces to be produced, the method of working, and the condition of the equipment to be used.

FOUR STEPS—and you've got the right answer!

1. Move arrow to major class covering application
2. Select sub-group which best fits application
3. Note major tool characteristics (under arrow) and other characteristics in cut-outs for each grade in sub-group
4. Select tool steel indicated

That's all there is to it!

Here's an example:

Application—Deep drawing die for steel

Major Class—Metal Forming—Cold

Sub-Group—Special Purpose

Tool Characteristics—Wear Resistance

Tool Steel—Airdi 150

One turn of the dial does it!

And you're sure you're right!

Crucible Steel Company of America
Dept. S, Chrysler Building, 405 Lexington Avenue
New York 17, N. Y.
Gentlemen:
Sure! I want my free CRUCIBLE TOOL STEEL SELECTOR!

Name_____ **Title**_____

Company_____

Street_____

City_____ **State**_____

CRUCIBLE first name in special purpose steels

TOOL STEELS

52 years of Fine *steelmaking*

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DENVER • DETROIT HOUSTON, TEXAS • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH • PROVIDENCE ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

0.3Y and 1.2Z metering accuracy classifications. Type C Hipersil cores are employed.

Transformer is mounted in a single-piece, deep-drawn steel case with a welded base. It uses HV bushings mounted without bushing flanges.

Electronic Thickness Tester

USE REPLY CARD—CIRCLE No. 7

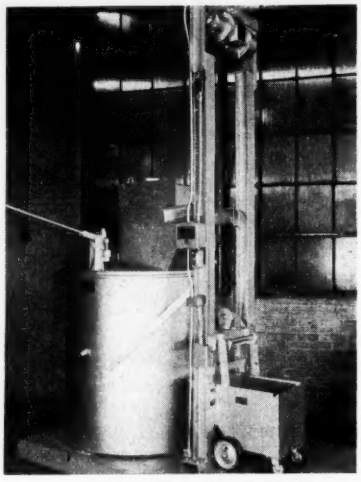
Single instrument that determines thickness of common deposits on a variety of base metals, including nonmagnetaics, is offered by Kocour Co., 4800 S. St. Louis Ave., Chicago 32, Ill. Tests can be made within 90-95 per cent depending on type and thickness of plate. Tester requires no reference to charts or graphs and there are no endpoints to detect. Average test takes about one minute.

Minimum thickness that can be determined is 0.00005-inch (0.000005-inch for chromium). Maximum is indefinite. In operation, tester strips plate from a predetermined area, about ⅛-inch diameter, then shuts off automatically when the test is complete. Thickness is read directly from the counter on the instrument panel when test is complete.

Automatic Metal Loader

USE REPLY CARD—CIRCLE No. 8

C. M. Kemp Mfg. Co., 405 E. Oliver St., Baltimore 2, Md., offers a fully automatic metal loader designed to speed all types of metal melting. In operation, the loader's detachable cart raises metal load, dumps it and returns to loading position. Through its application, heavy hand loading and obnoxious fumes common to this type of work



. . . eliminates heavy hand loading

are eliminated. Metal carts are rolled into lifting position, from where they are raised and dumped by the electric hoist. Limit switches prevent operation until the cart is in correct lifting position.

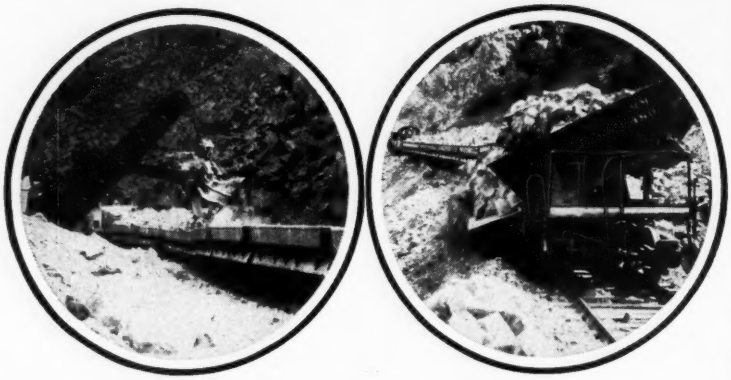
Hoist frame is bolted in position at the floor and side of the pot. No top support is needed. Clearance of 5 feet 10 inches from flange of pot to top of frame is required.

General Service Pump Line

USE REPLY CARD—CIRCLE No. 9

Standard mechanical shaft seals are used in place of conventional stuffing boxes in a new line of horizontal, split-case general service pumps announced by Peerless Pump Division, Food Machinery & Chemical Corp., Los Angeles 31, Calif. Advantages attributed to the shaft seal construction in-

Yes, you're seeing DOUBLE DOUBLE



In fact, when you watch Differential Air Dump Cars in action you're seeing double in several respects —

DOUBLE ACTION — they dump cars both ways, to left or to right. The 50° dumping angle assures a clean dump, and the massive air cylinders (two on each side) assure speedy, reliable dumping power. The double trunnion, double fulcrum design are key features in Differential's amazing performance.

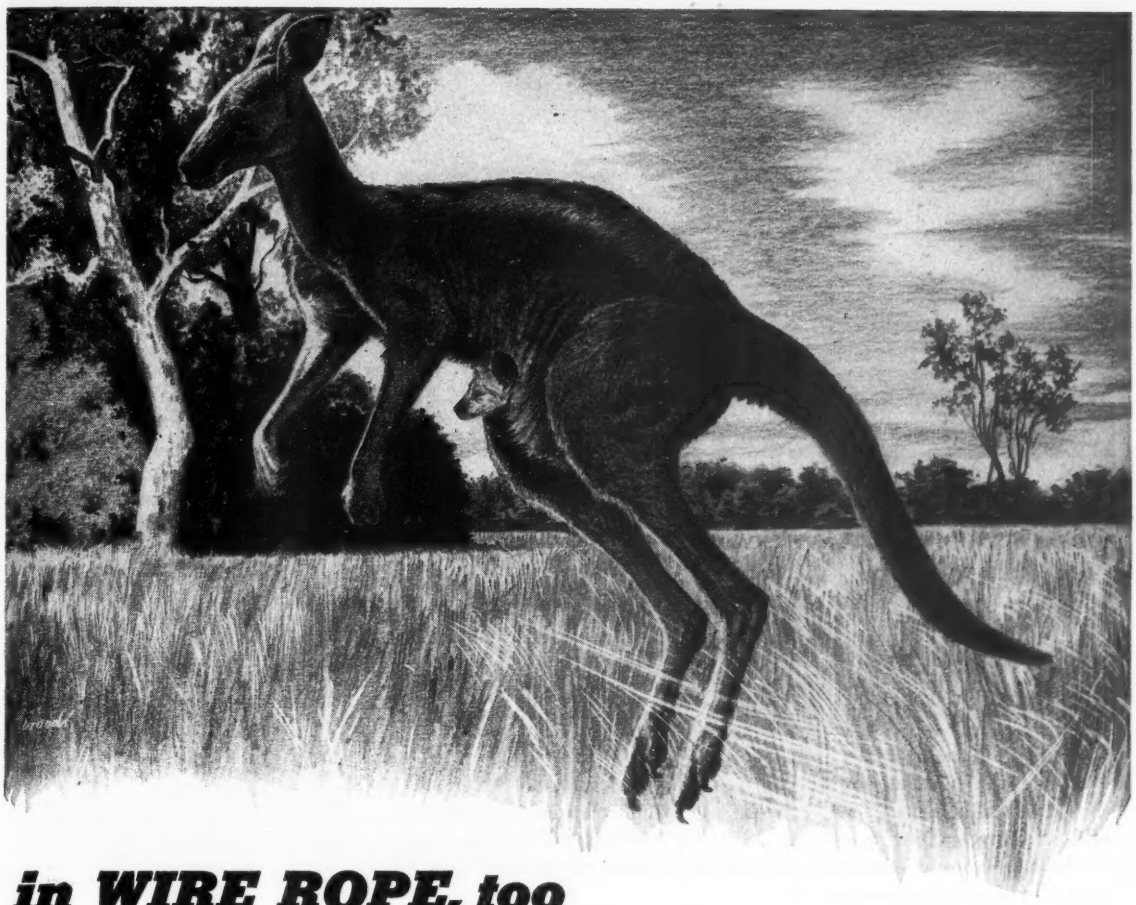
DOUBLE UTILITY — Good for hauling in ore and good for hauling out waste materials. Car is built to withstand abuse and heavy service. If you haul as many as 400 to 500 carloads yearly, the savings with Differential equipment will pay for the cars.

Differential Products Include: Air Dump Cars, Locomotives, Mine Cars, Mine Supply Cars, Rock Larries, Mantrip Cars, Dumping Devices and Complete Haulage Systems

DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO

SINCE 1915 — PIONEERS IN HAULAGE EQUIPMENT



in WIRE ROPE, too the RIGHT KIND of muscle makes the difference

Endowed with highly specialized leg muscles, the kangaroo is able to make tremendous flying leaps—even with Junior perched in the rumble seat.

In wire rope, too, specialized jobs call for specialized muscles. That's why in Wickwire Rope we make sure you always get the proper combination of physical properties to best resist the destructive forces found on your particular job—whether it be abrasion, load strain, shock stress or bending fatigue.

Wickwire Rope gives you the benefit of long experience and specialized know-how which assures you of exactly the right kind of rope your particular job demands.

For additional information write or phone our nearest sales office.

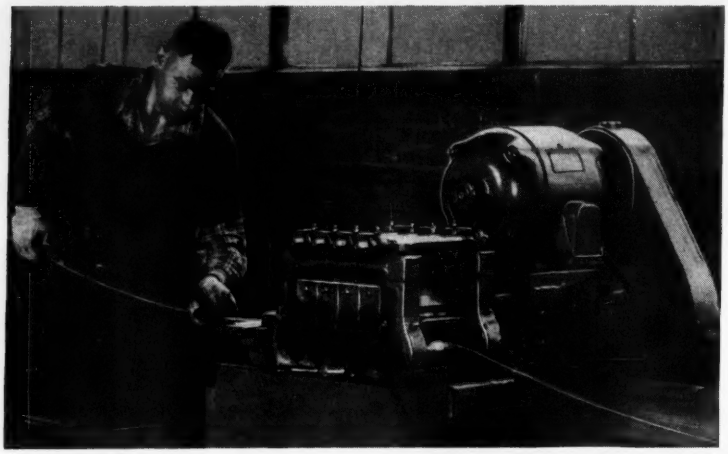
LOOK FOR THE YELLOW TRIANGLE ON THE REEL

THE COLORADO FUEL & IRON CORPORATION—Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
THE CALIFORNIA WIRE CLOTH CORPORATION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New York • Philadelphia

WICKWIRE ROPE

CF&I

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION



DOLAN STEEL flattens a wide range of materials and sizes with their

TORRINGTON 9-ROLL FLATTENER

Designed to remove the buckles and waves from slab, strip and sheet metal, producing it commercially flat, Torrington Flatteners are made in a wide range of sizes, for ferrous or non-ferrous metals. The model shown above, in Dolan Steel Company's Bridgeport warehouse, handles mild steel in gauges from .050" to .187". All Torrington Flatteners have the built-in features that mean accurate, dependable performance over a long life of grueling service.

CHECK THESE SUPERIOR FEATURES:

1. All rolls are of alloy steel, hardened and ground, with large necks and bearings. All rolls are driven by spindles or universal joints; drive pinions are in oil-tight casings.
2. Top rolls have parallel individual adjustment; roll housings are of capped type, for easy roll removal.
3. Welded steel base is entirely self-contained; motor is mounted overhead to conserve floor space.
4. All gearing is totally enclosed and runs in oil; all moving parts are amply guarded for operator protection.
5. Built to the precision standards for which Torrington machines have been famous throughout American industry for over 65 years.

Torrington's decades of experience and knowledge, gained from continuous collaboration with foremost makers and fabricators of metal, are at your service to help you put Torrington Flatteners — or any other Torrington special-purpose machinery — to profitable use in your plant.

Call or write Torrington for information and name of nearest Torrington representative.

The TORRINGTON

MANUFACTURING COMPANY • TORRINGTON, CONNECTICUT

DESIGNERS AND BUILDERS OF MILL MACHINERY FOR SIXTY-FIVE YEARS

clude savings in floor space, shorter shaft lengths, easier pump servicing and some improved performance characteristics.

Pump line is designated Peerless type AS. It is made in discharge sizes from 1½-inch through 4 inches. Maximum capacities range to 750-gpm; head range reaches 230 feet. Its general application is found in pumping water and clear liquids to 200°F, where no solids are in suspension.

Top-Fired Crucible Furnace

USE REPLY CARD—CIRCLE No. 10

Morrison Industries, 17700 Broadway, Bedford, O., offers a complete line of Markley top-fired standard crucible furnaces, from No. 50 to 400. These oil or gas-fired furnaces are available in

. . . available in single or twin units

single or twin units. Company reports a fuel saving of 25-30 per cent on aluminum; up to 50 per cent on brass and copper. Other advantages attributed to these units are longer burner and pot life. Rapid heating results from combined radiant and convection design. Linings are easy to replace because there are no burner ports.

Flexible-Shaft Unit Drives

USE REPLY CARD—CIRCLE No. 11

Elliot Mfg. Co., Binghamton, N. Y., announces a line of flexible shaft unit drives in heavy, medium, and light duty, and drill shaft size ranges. Heavy-duty range provides 180 different standard units, varying in style of end fittings, bearings, and lengths of shafting and with core diameters from ½ to 1¼-inch. Medium-duty drives are available in six core sizes, from 5/16 to ⅝-inch diameter. They can be attached to any power source and can be used for all op-

HOOVER

a cool operator

A motor that gets "hot" under pressure can make users "hot" under the collar, too. So, for *your* product, you want a motor that's sure to run cool.

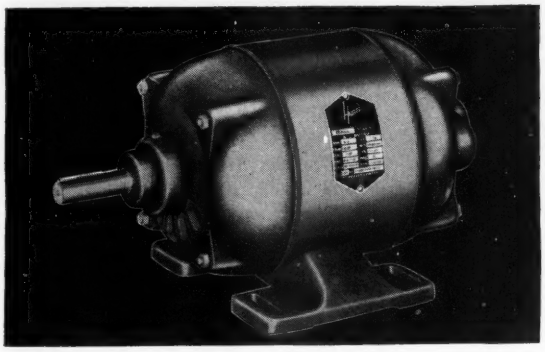
And Hoover makes it.

Generous air passages over and around the windings force the big ventilating system to draw off all excess heat and carry it into the surrounding atmosphere. Engineered to do away with friction and drag, Hoover motors not only run cool, they stay cool.

They're quiet too. And easy on electric current. Each watt of electricity gives its most in usable power.

On heavy-duty jobs, *high starting torque* spins hard-to-start machinery into action without strain or vibration. *High running torque* carries even a varying load smoothly. And on all kinds of jobs, Hoover Motors pile up records for staying young and vigorous through a long, full life.

And service? *When* it's needed, *where* it's needed. Hoover's service facilities are world-wide—always ready to protect your customers and to guard your good name.



Special-purpose motors. There probably are models in the Hoover line that will meet your specifications "as is"—including models for pumps, oil burners, fans and blowers.

General-purpose motors. A widely varied choice of *Capacitor-Start, Split-Phase* and *Poly-Phase Motors.*

Ask your distributor, or write us direct.

THE HOOVER COMPANY

Kingston-Conley Division

62 Brook Avenue North Plainfield, New Jersey

HOOVER® electric motors

since 1934

erations possible with a complete flexible shaft machine. Light-duty drive has a ⅜-inch diameter core; the drill shaft, a ¼-inch diameter core.

Straight-Line Process Control

USE REPLY CARD—CIRCLE No. 12

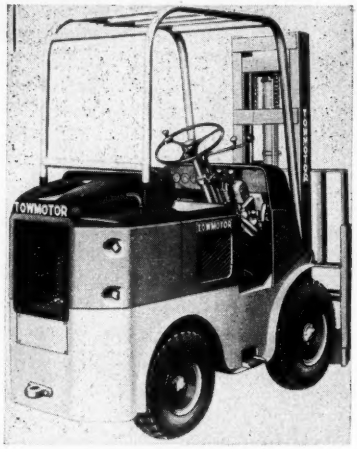
Instrument that provides close control of electrically-heated or fuel-fired industrial process equipment is a development of Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Philadelphia 44, Pa. Called the Pyr-O-Vane controller, the instrument is a time-proportioning indicating millivoltmeter controller. Its use is calculated to improve product quality, reduce rejects. It establishes straight-line control where rapid heating rates, small heating capacity or abnormal process lags are encountered.

Instrument has a variable proportional band between 1 and 3 per cent of full scale. Calibrated adjustment feature facilitates set changing. A set of change gears provides a choice of six cycle times to meet varied process requirements.

Overhead Fork Truck Guard

USE REPLY CARD—CIRCLE No. 13

Maximum protection is provided fork lift truck operators in high-stacking work by an overhead guard attachment offered by Towmotor Corp., 1226 E. 152nd St., Cleveland 10, O. Made of 1½ and 2-inch steel pipe, the guard is recommended for application on trucks with a lift exceeding 144 inches. Back sections of the side frame members are 1½-inch standard black steel pipe; front sections telescope over the back section and are 2-inch pipe. Cross sections are notched and arc welded to the side frame members. Guards can be attached easily in field installations on the company's standard fork lift truck models.



. . . protection in high-stacking work

Heavy-Duty Belt-Driven Fan

USE REPLY CARD—CIRCLE No. 14

Chelsea Fan & Blower Co. Inc., 639 South Ave., Plainfield, N. J., offers a heavy-duty belt-driven fan for industrial applications. Specific uses are indicated in duct work, mine exhaust systems and filtering units where large volumes of air are enclosed under static pressure.

Fan has nonoverloading cast aluminum airfoil-type propellers. These units are completely ball bearing and motors are totally enclosed. Fans are available in sizes

BE PREPARED { *To increase production* / *To lower costs*

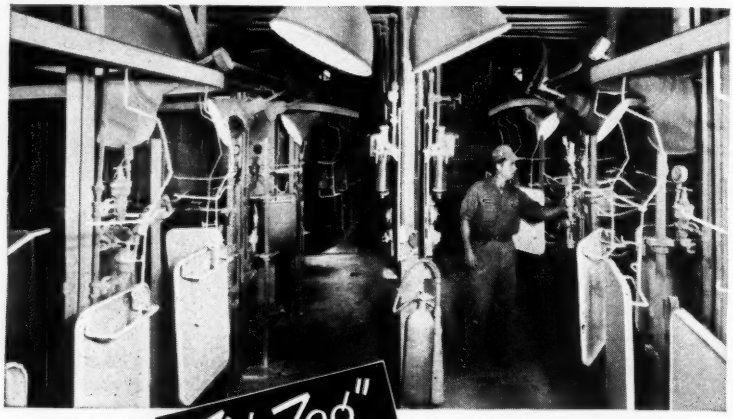


Photo courtesy Hamilton Mfg. Corp.

"Zig-Zag"® with R-W Continuous Power Conveyor

Are you prepared to get the maximum efficiency possible from your production line? Or are you face to face with a profit-eating handling bottleneck? Well, here's the answer to your problem—Richards-Wilcox ZIG-ZAG Continuous Power Conveyor.

ZIG-ZAG Continuous Power Conveyors are a patented and exclusive engineering achievement of Richards-Wilcox. You'll find them constantly at work in every type of industry—boosting production, lowering costs, solving man-power problems and raising production line efficiency.

ZIG-ZAG Conveyor Systems are remarkable for their versatility and adaptability. Their unique construction features make them quickly, easily and safely convertible to handling materials in almost any industry. Each unit is engineered to fit perfectly into existing layout and conditions.

Tremendous savings in manpower costs and time pay for the installation often in less than a year's time. See how you can bring bigger profits, maximum efficiency to your production line. Check up on R-W ZIG-ZAG Continuous Power Conveyors with your nearest dealer today.

Engineered for Economy and Flexibility

- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves —two-foot radius.

For complete details, or a prompt engineering consultation without any obligation, write our nearest office today.

Richards-Wilcox Mfg. Co.
"A HANGER FOR ANY DOOR THAT SLIDES"
AURORA, ILLINOIS, U.S.A. Branches in all principal cities
SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT
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OVER 72 YEARS

from 24 to 48 inches; air deliveries, from 5000 to 28,000 cfm.

Electrically-Heated Valves

USE REPLY CARD—CIRCLE No. 15

Electrically - heated valves designed to keep valve mechanisms clear of frost and ice in liquid carbon dioxide lines at temperatures as low as minus 110° F, are announced by Okadee Co., Chicago 4, Ill. All heated valve sizes from 2 to 6 inches are available with pneumatic, hydraulic, solenoid or manual control.

Vise and Angle Plate

USE REPLY CARD—CIRCLE No. 16

Squar-Up, a combination vise and angle plate with two independent clamping jaws is available from Kearsarge Tool & Mfg. Co., Pittsburgh, Pa. Jaws can be adjusted to a number of positions, permitting clamping pressure to be put directly on the right spot to hold workpiece securely.

All-Plastic Safety Goggle

USE REPLY CARD—CIRCLE No. 17

No. 91 Monogoggle, an improved all-plastic safety goggle is offered by Willson Products Inc., Reading, Pa. It features a flexible fully transparent frame molded of vinylite. Lens is of 0.060-inch acetate and is separately replaceable.

Time Delay Switch

USE REPLY CARD—CIRCLE No. 18

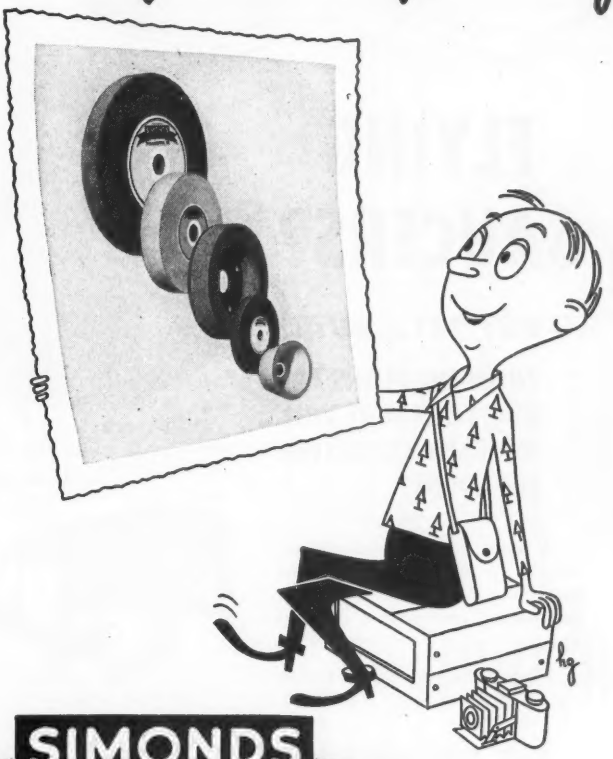
An improved time delay switch introduced by Pneu-Trol Devices Inc., Chicago, Ill., is provided with a wide variety of thrust linkages for either right or left downthrust, upthrust or horizontal thrust actuation. It can be provided to dwell in any 20 to 1 ratio from a minimum of ¼-second to a maximum of 60 seconds.

Hand Tachometers

USE REPLY CARD—CIRCLE No. 19

O. Zernickow Co., New York 7, N. Y., offers universal tachometers and single range tachometers. Both feature a knife-edge hand that makes almost two complete turns for each range. Units are not affected by rapid acceleration or normal overspeeding. A light wind vane damping mechanism

They're a "snap" for better grinding



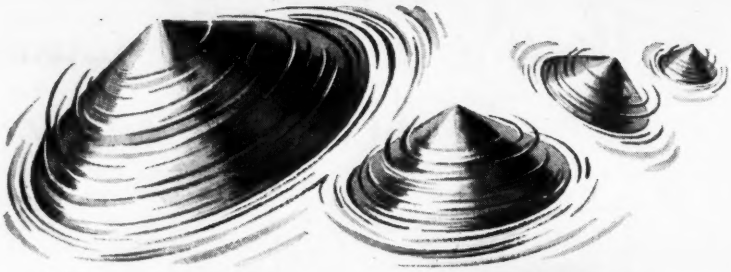
SIMONDS ABRASIVE CO.

Grinding Wheels

Put better grinding in *your* production picture. Send now for free data book describing Simonds complete line. It includes grinding wheels "developed" in every combination of grain and grade . . . mounted wheels and points, segments and abrasive grain . . . all accurately specified to enable you to "focus" on the right answer to your grinding problems. We'll also send you the name of the distributor ready to serve you with these consistently dependable production tools . . . backed by Simonds Abrasive Company's 60 year reputation as a major grinding wheel manufacturer. Write

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.



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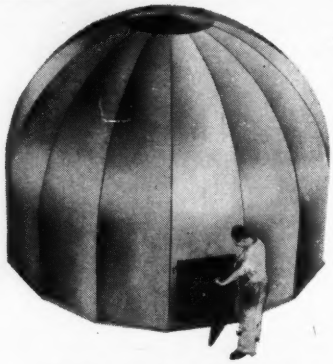
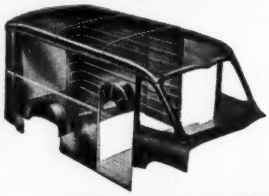
WHEN THE PLANS ARE READY..BRANDT WILL BE READY TO DELIVER THE GOODS!



The Navy enlisted Brandt's facilities for "Mothball" . . . **And Brandt delivered!**

Whatever the metal-working job . . . Brandt's mass-production facilities are ready to serve both government and private contractors.

Place your order with Brandt . . . and save!



A major automotive manufacturer wanted unusual stampings in a hurry . . . **And Brandt delivered!**

WRITE TODAY FOR A HANDY FILE FOLDER ON BRANDT'S MASS-PRODUCTION FACILITIES

A machinery builder needed large weldments . . . **And Brandt delivered!**

Parts or complete assemblies, mass-produced to exact specifications . . . **delivered on time!**

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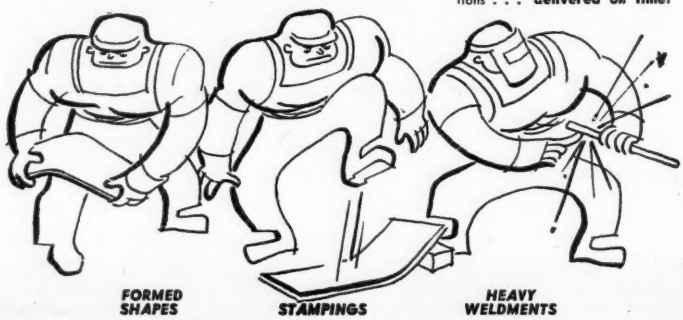
BALTIMORE



FORMED SHAPES · STAMPINGS · HEAVY WELDMENTS

CHARLES T. BRANDT, Inc. **BALTIMORE 30, MD.**

eliminates all vibration of the indicating hand.

Sealed Ball Bearings

USE REPLY CARD—CIRCLE No. 20

Red Seal bearings, developed by SKF Industries Inc., Philadelphia 32, Pa., are designed to keep dirt out and lubricant in. The seal extends below the steel retaining ring forming a flexible lip that lightly touches a uniform chamfer of the inner ring. Seal is made of DuPont Fairprene and is not affected by petroleum base lubricants, normal operating temperatures or aging.

Stroboscope Unit

USE REPLY CARD—CIRCLE No. 21

Labstrobe model 18, a small stroboscope unit giving 60 brief flashes of light per second when connected to an ordinary 60 cycle ac power line is announced by Berkshire Laboratories, Lincoln, Mass. It is useful for determining speeds of rotation of motors, machines and other objects.

Coolant Pump Magnet

USE REPLY CARD—CIRCLE No. 22

Magnetool coolant cleaner, made by Multifinish Mfg. Co., Detroit 7, Mich., is recommended for toolroom grinders and lathes or for light production drilling, tapping, valve grinding machines, etc. Unit is suspended under pump intake in coolant tank. All floating steel particles are trapped by magnet.

Powder Cameras

USE REPLY CARD—CIRCLE No. 23

Two x-ray diffraction powder cameras are offered by Research & Control Instruments Division, North American Philips Co., Inc., Mt. Vernon, N. Y. Available in two sizes, 114.59 mm and 57.3 mm diameters, they will record up to 17 angstrom spacings with copper radiation, low air scatter and clear

USE A REPLY CARD

Just circle the corresponding number of any item in this section for more information.

Yours FOR THE ASKING

TEAR OUT CARD; FILL IN and MAIL TODAY!

71. Ventilators & Louvers

Burt Mfg. Co.—If you are faced with problems of factory ventilation, you may find the answers in 12-page illustrated bulletin SPV-101-D. Complete data are given on continuous ridge, gravity, free-flow fan, standard fan, centrifugal fan, low type fan and free-exhaust ventilators, ventilator bases and wall louvers.

72. Bulk Conveyors

Link-Belt Co.—You'll find photos of Bulk-Flo conveyors and elevators in a wide variety of applications, together with typical layout drawings, engineering data, calculation tables, charts and formulas in 28-page booklet No. 2475. Over 150 materials are analyzed for average weight, size, flowability and abrasiveness. Bulk-Flo unit can serve as self-feeding conveyor or conveyor-elevator in one fully enclosed assembly.

73. Industrial Rail Equipment

Manufacturers Equipment Co.—Pictures and text descriptive of Meco powerdriven transfer cars and tractors, as well as narrow-gage turntables are contained 4-page bulletin No. 5. Cars are furnished with battery, trolley line or gasoline engine drives, while tractors have either battery or engine drives.

74. Centralized System Lube

New York & New Jersey Lubricant Co.—Have you ever considered using Non-Fluid oil for centralized and one-shot lubrication systems? Here, in bulletin No. 522, you can read of the advantages to be derived from use of this product, plus determining which grades can be used in your existing Lincoln, Farval, Trabon, Alemite and other systems.

75. Gearmotors

Miehle Printing Press & Mfg. Co., Star-Kimble Motor Div.—Details of line of gearmotors in ratings from ½ to 75 hp are given in 8-page illustrated bulletin B-601. These units are comprised of motor and speed reducer in single compact housing, and have speed ratios ranging from 2.5:1 to 97:1. Alternating current squirrel-cage and wound rotor motors and direct current series, shunt and compound models are offered with various frame constructions.

76. Millivoltmeter Controller

Minneapolis-Honeywell Regulator Co., Industrial Div.—Features, applications, control characteristics, operation, specifications and scale ranges for Brown Pulse Pyr-O-Vane time-proportioning indicating millvoltmeter controller can be found in 8-page illustrated bulletin 1052.

77. Machine Tools

Morey Machinery Co.—One 6-page and two 1-page illustrated bulletins briefly outline line of lathes, milling machines, Raskin presses, grinding machines and other machine tools handled by this company. Many are of foreign manufacture and—get this—are available for prompt delivery without priority.

78. Overhead Cranes

Michigan Crane & Conveyor Co.—Fluid couplings make the big difference in Michigan motor driven cranes! So says 6-page folder which describes and illustrates single and double girder, top running and underhung cranes, as well as models which are hand geared or hand pushed.

79. Hydraulic Cutting Tools

Manco Mfg. Co.—8-page illustrated catalog No. 152 is decriptive of Guillotine high-pressure hydraulic tools which provide up to 50 tons pressure for cutting materials ranging from ½-in. steel rod to 3½-in. armored cable. Tools are portable, and hydraulic power is provided by hand, foot or power pump assemblies.

6-16-52

STEEL
Penton Building, Cleveland 13, Ohio

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80. Steam Specialties

McDonnell & Miller, Inc.—Designed as a workbook to help in the selection and application of safety devices for steam and hot water boilers, 24-page illustrated data book SC-2 contains capacity curves, dimension drawings and engineering data. Described are boiler water feeders, low water fuel cut-offs, pressure and temperature relief valves, float operated switches, small float valves, flow switches and similar devices.

81. Tachometer Indicators

Metron Instrument Co. — Three-range single-head fixed type series 42P tachometer indicators for speed measuring applications are described in illustrated technical data sheet No. 42P. Units indicate speeds from 1 to 100,000 rpm.

82. Twin Crucible Furnaces

Morrison Industries, Inc. — Here's your chance to get all the pertinent information on Markley recuperative twin crucible furnaces for melting many nonferrous alloys. With this unit, you fire one furnace while waste gases heat the second furnace. Four-page brochure No. C-101 has specifications, general data, and line drawings of various models. Insert compares production of single and twin crucible furnaces on red brass.

83. Welding Mild Steel

McKay Co.—Guidance for welding mild and low alloy steel is provided in procedure handbook entitled "The Welding of Mild Steel". Included are tables of specifications, operating characteristics, mechanical properties, uses and other essential data on line of special purpose electrodes.

84. Signal Batteries

National Carbon Co.—Construction and application of Eveready air-depolarized, constant voltage primary batteries are described in illustrated catalog section R-9505. Air Cell type AC-500 batteries use standard glass jars and have a 500 ampere-hour capacity. Box type T series is offered in single cell or two cells in series and has capacities of 300 or 600 ampere-hours.

85. Crane Taglines

McCaffrey-Ruddock Tagline Corp. —By way of explanation, a tagline is a device used on cranes to prevent the digging bucket from spinning. In this 16-page brochure "Rud-o-Matic Foolproof Taglines," this company's line of taglines is described and illustrated. They operate on a spring principle and maintain a positive tension for steadying a bucket under any conditions. General information and specifications for taglines and Rud-o-Matic magnet cable reels are given.

86. Machine Tools

Multiversal Machine Co. — Wide variety of machining operations, including vertical and horizontal milling, jig boring, slotting, filing, drilling, grinding, broaching, jig sawing, lathe work, key seating and many others can be performed by Hack Multiversal machine tool, described and illustrated in 12-page brochure.

EDITORIAL REPRINTS:

87. Lathe Vibration Detector

Detecting and eliminating vibration in a machine tool is time consuming as well as costly in money and labor. Send for STEEL reprint "Lathe Vibrations Pinpointed" which reports on electronic device made by Lion Mfg. Co. which picks up and isolates vibrations causing unbalance in newly assembled lathe.

88. Stainless Extrusion

STEEL reprint entitled "New Method Makes Stainless Extrusion Practical" is descriptive of the French Ugine-Sejournet hot extrusion process as employed by Babcock & Wilcox Co. Process features use of glass as lubricant instead of carbonaceous materials previously used.

89. Reclaiming Borings

"New Process Reclaims Borings" is title of STEEL reprint which describes and illustrates process introduced in the United States from England that makes it possible for cast iron borings to be reclaimed under normal foundry conditions. Device which makes process feasible is air-operated injector ram incorporated in the entry duct of the cupola. Savings in cost are high.

90. Blast Furnace Practice

Charles E. Agnew, Cleveland consultant for blast furnace and sintering plant operations, in STEEL reprint "Beneficiation of Air—XI(a)" explains and discusses factors that influence value of dry and moist blast on furnace operating economy and the relationship between high pressure blowing and raw materials.

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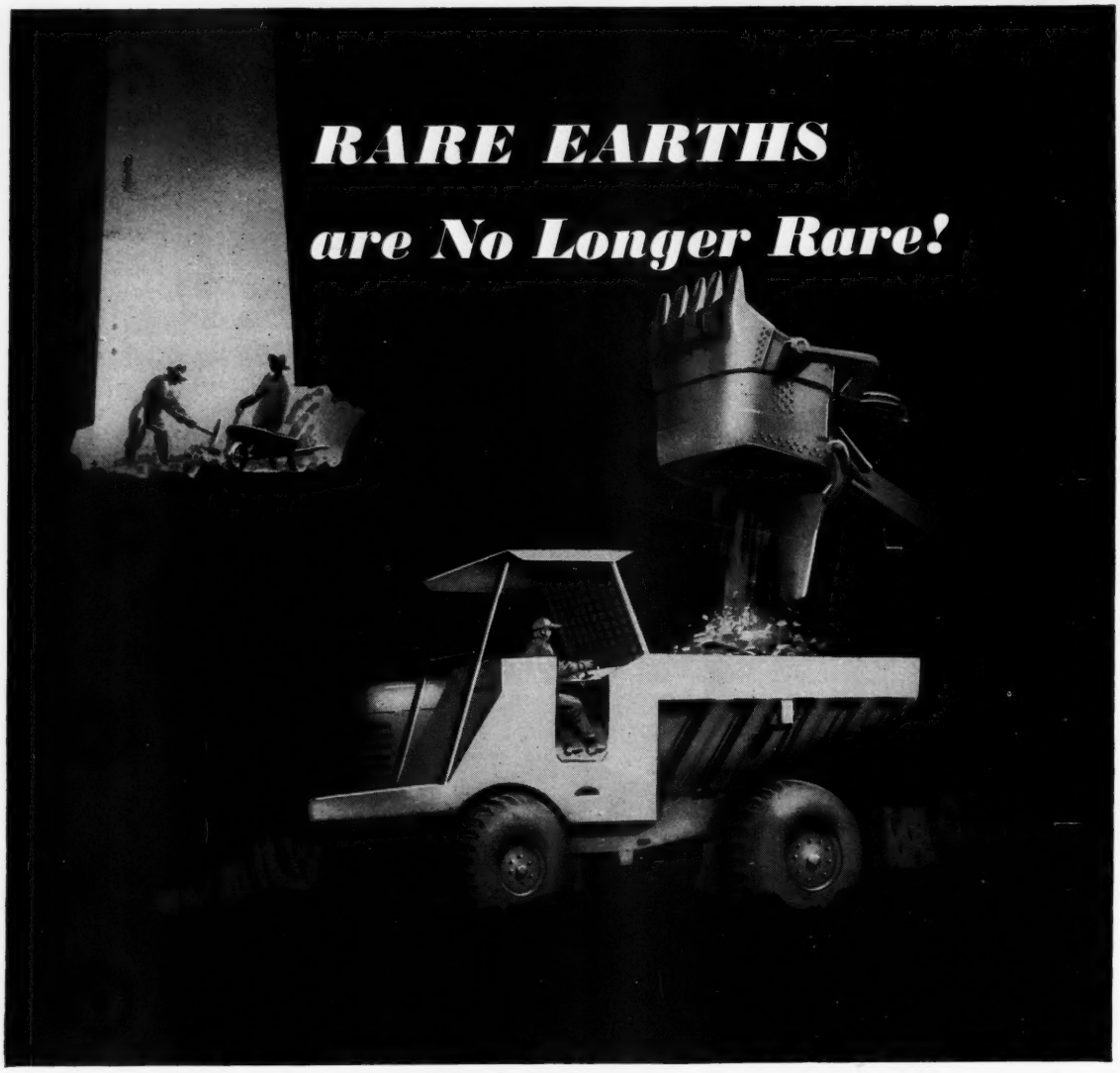

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The Market Outlook

JUST HOW MUCH of an impact have the work stoppages in the steel industry had on the steel supply?

Not as much as you might think from listening to the tumult from Washington.

Even with the steelworkers' three work stoppages this year the 1952 steel ingot output through June 14 was only 3 million tons less than in the corresponding period of 1951, a year in which steel output set an alltime record. At the industry's present record capacity, 3 million tons is only 1½ weeks' output at capacity rates. And in the last year capacity operation has been commonplace.

Steel ingot output through mid-June of last year was 47,760,000 net tons. Through the comparable period of this year it was 44,505,000 tons.

COUNTERBALANCE—The 3-million ton loss could be made up the rest of this year through additional capacity that will come into operation. This is to be the biggest year from the standpoint of new capacity coming in under the steel industry's current expansion program. To the industry's record capacity of 108,587,670 net tons on Jan. 1 of this year were to be added these additional yearly capacities: 631,000 tons in the first quarter, 2,919,600 tons in the second quarter, 3,214,300 tons in the third quarter, and 1,688,800 tons in fourth quarter.

Some of the expansion programs are behind schedule and the latest strike of steelworkers delayed them further, for in some instances construction workers refused to cross steelworkers' picket lines. Even with some delay in the expansion schedule the industry has the benefit of a larger capacity this year than in 1951. If all of the capacity could have been added according to schedule this year the total capacity at the end of this year would be 117 million tons.

OUTLOOK—Another thing, in addition to increased capacity, that eases the blows of the work stoppages is a reduced demand for steel. Pressure for steel this year is distinctly less than in 1951. Market analysts of one of the big steel companies expect total steel demand in 1952 to be between 105 million and 110 million tons. The 105 million figure would be no more than was turned out last year.

Not all of the steel industry is struck. Still operating are producers with 14 per cent of the nation's capacity.

CHOKED DOWN—Steelmaking operations in the week ended June 14 averaged 13 per cent of capacity.

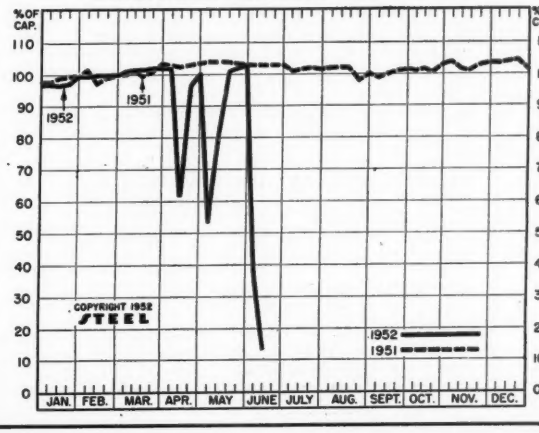
Helping ease the impact of the strike will be the metalworking plants' mass summer vacations, which will temporarily cut the consumption of steel. Some plants, however, will not take mass vacations. Notably they are the auto factories and their suppliers.

Indicative of the improved inventories at consumers' plants at the start of the strike and the preparations made by consumers to weather the strike is the situation with can makers. Normally, producers keep a fairly large stock of tin plate in their plants and ship to can makers as needed. In the last few months, can makers accepted shipments in advance of use and stocked materials at their plants.

TROUBLES FOR SOME—Of course there will be instances of hardship among steel users. Some with sufficient over-all tonnage will be hamstrung by the lack of one particular shape or size of steel. First shortage likely to be felt will be in carbon bars, in heavy demand because of the defense program. Another danger spot is wide and heavy carbon plates. An upswing in shipbuilding calls for a sizable tonnage of plates.

WATCH SCRAP—A softening in the scrap market may follow the steel strike. Mill stocks had improved before the strike, and in the Pittsburgh district, for instance, they range from 45 to 60 days' requirements. Dealer shipments are being held up, but production scrap from metalworking plants continues to flow toward the mills. This material is being laid down outside the plants and will be moved to them after the strike.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended June 14	Change	Same Week 1951	Same Week 1950
Pittsburgh	2	—23.5*	100.5	101.5
Chicago	8	—29	104.5	102.5
Mid-Atlantic	19	—27	101	98
Youngstown	0	—28	105	106
Wheeling	51.5	—10	98.5	106.5
Cleveland	0	—25	100.5	101.5
Buffalo	0	—12	104	104
Birmingham	0.5	—27.5	100	100
New England	25	— 3	85	85
Cincinnati	40	—20	104	104
St. Louis	38.5	—16.5*	95	91
Detroit	32	—13	108	109
Western	45	— 6	105.5	93
Estimated national rate	13	—24.5	103	101

Based on weekly steelmaking capacity of 2,077,040 tons in 1952; 1,999,034 tons for 1951; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950.

* Change from revised rate for preceding week.

The Metalworking Outlook—p. 59 Production-Engineering News—p. 95

Composite Market Averages

	June 12 1952	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100) ..	171.92†	171.92†	171.92†	171.92	118.67
Index in cents per lb.	4.657†	4.657†	4.657†	4.657	3.215
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$106.32†	$106.32†	$106.32†	$106.32	$69.82
No. 2 Fdry, Pig Iron, GT..	52.54	52.54	52.54	52.54	32.99
Basic Pig Iron, GT	52.16	52.16	52.16	52.16	32.49
Malleable Pig Iron, GT ...	53.27	53.27	53.27	53.27	33.71
Steelmaking Scrap, GT	43.00	43.00	43.00	44.00	31.25

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are base on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

† Preliminary, pending 1952 tin plate contract price announcement.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	June 12 1952	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	3.70	3.70	3.70	3.70	2.60
Bars, H.R., Chicago	3.70	3.70	3.70	3.70	2.60
Bars, H.R., del. Philadelphia	4.252	4.252	4.252	4.20	2.98
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.55	3.20
Shapes, Std., Pittsburgh ..	3.65	3.65	3.65	3.65	2.50
Shapes, Std., Chicago	3.65	3.65	3.65	3.65	2.50
Shapes, del. Philadelphia ..	3.93	3.93	3.93	3.91	2.64
Plates, Pittsburgh	3.70	3.70	3.70	3.70	2.65
Plates, Chicago	3.70	3.70	3.70	3.70	2.65
Plates, Coatesville, Pa. ..	4.15	4.15	4.15	4.15	2.80
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.70	2.65
Plates, Claymont, Del.	4.15	4.15	4.15	4.15	2.80
Sheets, H.R., Pittsburgh ..	3.60–75	3.60–75	3.60–75	3.60–75	2.50
Sheets, H.R., Chicago	3.60	3.60	3.60	3.60	2.50
Sheets, C.R., Pittsburgh ..	4.35	4.35	4.35	4.35	3.20
Sheets, C.R., Chicago	4.35	4.35	4.35	4.35	3.20
Sheets, C.R., Detroit	4.55	4.55	4.55	4.55	3.35
Sheets, Galv., Pittsburgh ..	4.80	4.80	4.80	4.80	3.55
Strip, H.R., Pittsburgh ...	3.75-4.00	3.75-4.00	3.75-4.00	3.75-4.00	2.50
Strip, H.R., Chicago	3.50	3.50	3.50	3.50	2.50
Strip, C.R., Pittsburgh	4.65-5.35	4.65-5.35	4.65-5.35	4.65-5.35	3.20
Strip, C.R., Chicago	4.90	4.90	4.90	4.90	3.30
Strip, C.R., Detroit	4.85-5.60	4.85-5.60	4.85-5.60	4.35-5.60	3.35
Wire, Basic, Pittsburgh ...	4.85-5.10	4.85-5.10	4.85-5.10	4.85-5.10	3.425
Nails, Wire, Pittsburgh ...	5.90-6.20	5.90-6.20	5.90-6.20	5.90-6.20	4.125
Tin plate box, Pittsburgh..	$8.70	$8.70	$8.70	$8.70	$5.75

SEMIFINISHED

Billets, forging, Pitts. (NT)	$66.00	$66.00	$66.00	$66.00	$50.00
Wire rods, ⅜-⅝", Pitts. ..	4.10–30	4.10–30	4.10–30	4.10–30	2.55

PIG IRON, Gross Ton

Bessemer, Pitts.	$53.00	$53.00	$53.00	$53.00	$34.00
Basic, Valley	52.00	52.00	52.00	52.00	33.00
Basic, del. Phila.	56.75	56.75	56.75	56.49	35.52
No. 2 Fdry. Pitts.	52.50	52.50	52.50	52.50	33.50
No. 2 Fdry, Chicago	52.50	52.50	52.50	52.50	33.00
No. 2 Fdry, Valley	52.50	52.50	52.50	52.50	33.50
No. 2 Fdry, del. Phila. ...	57.25	57.25	57.25	56.99	36.02
No. 2 Fdry, Birm.	48.88	48.88	48.88	48.88	29.88
No. 2 Fdry (Birm.) del. Cin.	55.49	55.49	56.49	55.33	34.75
Malleable, Valley	52.50	52.50	52.50	52.50	33.50
Malleable, Chicago	52.50	52.50	52.50	52.50	33.50
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	66.00	40.50
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	188.00	140.25*

* F.o.b. cars, Pittsburgh.

SCRAP, Gross Ton (including broker's commission)

No. 1 Heavy Melt. Pitts...	$44.00	$44.00	$44.00	$45.00	$32.50
No. 1 Heavy Melt, E. Pa...	42.50	42.50	42.50	43.50	32.25
No. 1 Heavy Melt, Chicago.	42.50	42.50	42.50	43.50	29.00
No. 1 Heavy Melt, Valley..	44.00	44.00	44.00	45.00	35.00
No. 1 Heavy Melt, Cleve...	43.00	43.00	43.00	44.00	32.50
No. 1 Heavy Melt, Buffalo.	43.00	43.00	43.00	44.00	31.50
Rails, Rerolling, Chicago...	52.50	52.50	52.50	52.50	34.00
No. 1 Cast, Chicago	45.00	45.00	49.00*	49.00*	40.00

* F.o.b. shipping point.

COKE, Net Ton

Beehive, Furn, Connlsvl. ..	$14.75	$14.75	$14.75	$14.75	$8.75–9.50
Beehive, Fdry, Connlsvl. ..	17.50	17.50	17.50	17.50	9.75–11.50
Oven Fdry, Chicago	23.00	23.00	23.00	21.00	15.10

NONFERROUS METALS

Copper, del. Conn.	24.50	24.50	24.50	24.50	21.50
Zinc, E. St. Louis.....	16.00	16.00	19.50	17.50	10.50
Lead, St. Louis	14.80	14.80	14.80	16.80	14.80-14.85
Tin, New York	121.50	121.50	121.50	123.00	80.00
Aluminum, del.	19.00	19.00	19.00	19.00	15.00
Antimony, Laredo, Tex. ..	39.00	39.00	44.00	44.00	33.00
Nickel, refinery, duty paid.	56.50	56.50	56.50	56.50	35.00

PIG IRON

F.o.b. furnace prices quoted under GCPR as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax. Key to producing companies published on second following page.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa. B2	$54.00	$54.50	$55.00	$55.50
NewYork, del.	....	58.28	58.78	....
Newark, del.	57.02	57.52	58.02	58.52
Philadelphia, del.	56.75	57.25	57.75	58.25
Birmingham District				
Alabama City, Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward, Ala. W15	48.38	48.88	....	....
Cincinnati, del.	....	55.49	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda, N.Y. W12	52.00	52.50	53.00	....
No. Tonawanda, N.Y. T9	....	52.50	53.00	....
Boston, del.	62.11	62.61	63.11	....
Rochester, N.Y., del.	54.88	55.38	55.88	....
Syracuse, N.Y., del.	55.91	56.41	56.91	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary, Ind. U5	52.00	....	52.50	....
IndianaHarbor, Ind. I-2	52.00	....	52.50	....
So. Chicago, Ill. W14	52.00	52.50	52.50	....
So. Chicago, Ill. Y1	52.00	52.50	52.50	....
So. Chicago, Ill. U5	52.00	....	52.50	53.00
Milwaukee, del.	54.06	54.56	54.56	55.06
Muskegon, Mich., del.	....	58.47	58.47	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, O., del. from Cleve.	54.61	55.11	55.11	55.61
Lorain, O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie, Pa. I-3	52.00	52.50	52.50	53.00
Everett, Mass. E1	....	59.75	60.25	....
Fontana, Calif. K1	58.00	58.50	....	....
Seattle, Tacoma, Wash., del.	....	60.66	....	....
Portland, Oreg., del.	....	60.66	....	....
LosAngeles, SanFrancisco, del. ...	60.16	60.66	....	....
GraniteCity, Ill. G4	53.90	54.40	54.90	....
St. Louis, del. (inc. tax).....	54.66	55.16	55.66	....
Ironton, Utah C11	52.00	52.50	....	....
Geneva, Utah C11	52.00	52.50	....	....
LoneStar, Tex. L6	48.00	*48.50	48.50	....
Minnequa, Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
NevilleIsland, Pa. P6	....	52.50	52.50	53.00
Pitts., N.&S. sides, Ambridge, Aliquippa, del.	....	53.80	53.80	54.30
McKeesRocks, del.	....	53.54	53.54	54.04
Lawrenceville, Homestead, McKeesport, Monaca, del.	....	54.07	54.07	54.57
Verona, del.	....	54.57	54.57	55.07
Brackenridge, del.	....	54.82	54.82	55.32
Bessemer, Pa. U5	52.00	....	52.50	53.00
Clairton, Rankin, So. Duquesne, Pa. U5	52.00	....	....	....
McKeesport, Pa. N3	52.00	....	....	53.00
Monessen, Pa. P7	54.00	....	....	....
Sharpsville, Pa. S6	....	....	52.50	53.00
Steelton, Pa. B2	54.00	54.50	55.00	55.50
Swedeland, Pa. A3	56.00	56.50	57.00	57.50
Toledo, O. I-3	52.00	52.50	52.50	53.00
Cincinnati, del.	57.47	57.97	....	....
Troy, N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard, O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Youngstown U5	52.00	....	....	53.00
Mansfield, O., del.	56.65	57.15	57.15	57.65

* Low phos, southern grade.

PIG IRON DIFFERENTIAL

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.0-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson, O. G2, J1	$62.50
Buffalo H1	63.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

NiagaraFalls, N.Y. P15	$88.00
Keokuk, Iowa, Openhearth & Fdry, frt. allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb piglets, 16% Si, frt. allowed K2	95.50
Wenatchee, Wash., OH & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles, Tenn. T3	$66.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton, Pa. B2	60.00
Philadelphia delivered	63.55
Troy, N.Y. R2	60.00

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Semifinished and Finished Steel Products

Mills prices quoted under GCPR as reported to STEEL, June 12, 1952; cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Fontana,Calif. K1 ..$79.00
Munhall,Pa. U5 .....52.00
Seattle S24 .....73.00

INGOTS, Alloy (NT)
Detroit R7 .....$54.00
Fontana,Calif. K1 ....80.00
Houston S5 .....62.00
Midland,Pa. C18 .....54.00
Munhall,Pa. U5 .....54.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. U5 ...$56.00
Clairton,Pa. U5 .....56.00
Ensley,Ala. T2 .....56.00
Fairfield,Ala. T2 ....56.00
Fontana,Calif. K1 ...75.00
Gary,Ind. U5 .....56.00
Johnstown,Pa. B2 ....56.00
Lackawanna,N.Y. B2..56.00
Munhall,Pa. U5 .....56.00
So.Chicago,Ill. U5 ...56.00
So.Duquesne,Pa. U5 ..56.00

Carbon, Forging (HT)
Bessemer,Pa. U5 ....$66.00
Buffalo R2 .....66.00
Canton,O. R2 .....66.00
Clairton,Pa. U5 .....66.00
Cleveland R2 .....66.00
Conshohocken,Pa. A3..73.00
Detroit R7 .....69.00
Ensley,Ala. T2 .....66.00
Fairfield,Ala. T2 ....66.00
Fontana,Calif. K1 ...85.00
Gary,Ind. U5 .....66.00
Geneva,Utah C11 .....66.00
Houston S5 .....74.00
Johnstown,Pa. B2 ....66.00
Lackawanna,N.Y. B2..66.00
LosAngeles B3 .....85.00
Munhall,Pa. U5 .....66.00
Seattle B3 .....85.00
So.Chicago R2,U5,W14.66.00
So.Duquesne,Pa. U5 ..66.00
So.SanFrancisco B3 ..85.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$70.00
Buffalo R2 .....70.00
Canton,O. R2 .....70.00
Canton,O.(29) T7 ....66.00
Conshohocken,Pa. A3..77.00
Detroit R7 .....73.00
Fontana,Calif. K1 ....89.00
Gary,Ind. U5 .....70.00
Houston S5 .....78.00
Ind.Harbor,Ind. Y1 ...70.00
Johnstown,Pa. B2 ....70.00
Lackawanna,N.Y. B2..70.00
LosAngeles B3 .....90.00
Massillon,O. R2 .....70.00
Midland,Pa. C18 ....70.00
Munhall,Pa. U5 .....70.00
So.Chicago R2,U5,W14.70.00
So.Duquesne,Pa. U5 ..70.00
Struthers,O. Y1 .....70.00
Warren,O. C17 .....70.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 .....$82.00
Cleveland R2 .....82.00
Fontana,Calif. K1 ...103.00
Gary,Ind. U5 .....82.00
Massillon,O. R2 .....82.00
So.Chicago,Ill. R2 ...82.00
So.Duquesne,Pa. U5 ..82.00

SHEET BARS (NT)
Fontana,Calif. K1 ...$89.00

SKELP
Aliquippa,Pa. J5 ....$3.45
Munhall,Pa. U5 .....3.35
Warren,O. R2 .....3.35
Youngstown R2, U5 ..3.35

WIRE RODS
Alton,Ill. L1 .....4.40
AlabamaCity,Ala. R2 ..4.10
Buffalo W12 .....4.10
Cleveland A7 .....4.10
Donora,Pa. A7 .....4.10
Fairfield,Ala. T2 ....4.10
Fontana,Calif. K1 ....4.90
Houston S5 .....4.50
Johnstown,Pa. B2 ....4.10
Joliet,Ill. A7 .....4.10
LosAngeles B3 .....4.90
Minnequa,Colo. C10 ...4.35
Monessen,Pa. P7 .....4.30
No.Tonawanda,N.Y. B11.4.10
Pittsburg,Calif. C11 ...4.75
Portsmouth,O. P12 ....4.30
Roebling,N.J. R5 .....4.20
So.Chicago,Ill. R2 ....4.10
SparrowsPoint,Md. B2..4.20
Sterling,Ill.(1) N15 ...4.10
Struthers,O. Y1 .....4.10
Torrance,Calif. C11 ...4.90
Worcester,Mass. A7 ...4.40

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ...4.45
Lackawanna,N.Y. B2 ..4.45
Munhall,Pa. U5 .....4.45
So.Chicago,Ill. U5 ....4.45

STRUCTURALS
Carbon Steel Stand. Shapes
AlabamaCity,Ala. R2 .3.60
Aliquippa,Pa. J5 .....3.65
Bessemer,Ala. T2 .....3.65
Bethlehem,Pa. B2 ....3.70
Clairton,Pa. U5 .....3.65
Fairfield,Ala. T2 .....3.65
Fontana,Calif. K1 ....4.25
Gary,Ind. U5 .....3.65
Geneva,Utah C11 .....3.65
Houston S5 .....4.05
Ind.Harbor,Ind. I-2 ...3.65
Johnstown,Pa. B2 ....3.70
KansasCity,Mo. S5 ...4.25
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.25
Minnequa,Colo. C10 ...4.10
Munhall,Pa. U5 .....3.65
Niles,Calif.(22) P1 ...4.85
Phoenixville,Pa. P4 ...5.90
Portland,Oreg. O4 ....4.50
Seattle B3 .....4.30
So.Chicago,Ill. U5 W14.3.65
So.SanFrancisco B3 ...4.20
Torrance,Calif. C11 ...4.25
Weirton,W.Va. W6 ....3.90

Alloy Stand. Shapes
Clairton,Pa. U5 .....4.35
Fontana,Calif. K1 ....5.55
Munhall,Pa. U5 .....4.35
So.Chicago,Ill. U5 ....4.35

H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 .....5.50
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa.(14) B2 .5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 ....6.10
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Ind.Harbor,Ind. I-2 ...5.50
Ind.Harbor,Ind. Y1 ...6.00
Johnstown,Pa. B2 ....5.50
Lackawanna,N.Y.(14)B2 5.50
LosAngeles B3 .....6.05
Munhall,Pa. U5 .....5.50
Seattle B3 .....6.10
So.Chicago,Ill. U5 ....5.50
So.SanFrancisco B3 ...6.00
Struthers,O. Y1 .....6.00

Wide Flange
Bethlehem,Pa. B2 ....3.70
Clairton,Pa. U5 .....3.65
Fontana,Calif. K1 ....4.65
Lackawanna,N.Y. B2 ..3.70
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 ....3.65

H.S., LA. Wide Flange
Aliquippa,Pa. J5 .....5.50
Lackawanna,N.Y. B2 ..5.50
Munhall,Pa. U5 .....5.45
So.Chicago,Ill. U5 ....5.45

BEARING PILES
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 ....3.65

PLATES,High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.65
Bessemer,Ala. T2 .....5.65
Clairton,Pa. U5 .....5.65
Cleveland J5, R2 .....5.65
Conshohocken,Pa. A3 ..5.90
Fairfield,Ala. T2 .....5.65
Fontana,Calif.(30) K1..6.25
Gary,Ind. U5 .....5.65
Geneva,Utah C11 .....5.65
Ind.Harbor,Ind. I-2 ...5.65
Ind.Harbor,Ind. Y1 ...6.15
Johnstown,Pa. B2 ....5.65
Munhall,Pa. U5 .....5.65
Pittsburgh J5 .....5.65
Seattle B3 .....6.55
Sharon,Pa. S3 .....5.70
So.Chicago,Ill. U5 ....5.65
SparrowsPoint,Md. B2 .5.65
Warren,O. R2 .....5.65
Youngstown Y1 .....6.15

PLATES, Open-Hearth Alloy
Claymont,Del. C22 ....4.85
Coatesville,Pa. L7 ....5.25
Conshohocken,Pa. A3 ..5.05
Fontana,Calif. K1 ....5.70
Gary,Ind. U5 .....4.75
Johnstown,Pa. B2 ....4.75
Munhall,Pa. U5 .....4.75
Sharon,Pa. S3 .....5.20
So.Chicago,Ill. U5 ....4.75
SparrowsPoint,Md. B2 .4.75

FLOOR PLATES
Cleveland J5 .....4.75
Conshohocken,Pa. A3 ..4.75
Ind.Harbor,Ind. I-2 ...4.75
Munhall,Pa. U5 .....4.75
So.Chicago,Ill. U5 ....4.75

PLATES, Ingot Iron
Ashland,c.l. (15) A10 .3.95
Ashland,l.c.l. (15) A10..4.45
Cleveland,c.l. R2 .....4.30
Warren,O.c.l. R2 .....4.30

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Ashland,Ky. (15) A10 ..3.70
Bessemer,Ala. T2 .....3.70
Clairton,Pa. U5 .....3.70
Claymont,Del. C22 .....4.15
Cleveland J5, R2 .....3.70
Coatesville,Pa. L7 .....4.15
Conshohocken,Pa. A3 ..4.15
Fairfield,Ala. T2 .....3.70
Fontana,Calif.(30) K1 .4.30
Gary,Ind. U5 .....3.70
GraniteCity,Ill. G4 .....4.40
Geneva,Utah C11 .....3.70
Harrisburg,Pa. C5 .....6.30
Houston S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ..3.70
Minnequa,Colo. C10 ....4.50
Munhall,Pa. U5 .....3.70
Pittsburgh J5 .....3.70
Seattle B3 .....4.60
Sharon,Pa. S3 .....3.95
So.Chicago,Ill. U5 W14..3.70
SparrowsPoint,Md. B2 ..3.70
Steubenville,O. W10 ....3.70
Warren,O. R2 .....3.70
Weirton,W.Va. W6 ....4.00
Youngstown R2, U5, Y1.3.70

PLATES, Carbon A.R.
Fontana,Calif. K1 .....5.45
Geneva,Utah C11 .....4.85

PLATES, Wrought Iron
Economy,Pa. B14 .....8.60

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Alton,Ill. L1 .....4.15
Atlanta,Ga. A11 .....4.25
Bessemer,Ala. T2 .....3.70
Buffalo R2 .....3.70
Canton,O. R2 .....3.70
Clairton,Pa. U5 .....3.70
Cleveland R2 .....3.70
Detroit R7 .....3.85
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 ....4.40
Gary,Ind. U5 .....3.70
Houston S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
Los Angeles B3 .....4.40
Milton,Pa. B6 .....4.55
Minnequa,Colo. C10 ....4.15
Niles,Calif. P1 .....5.05
N.Tonawanda,N.Y. B11..3.70
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 .....3.70
Portland,Oreg. O4 ....4.65
Seattle B3, N14 .....4.45
So.Chicago R2, U5, W14.3.70
So.Duquesne,Pa. U5 ....3.70
So.SanFran.,Cal. B3 ....4.45
Struthers,O. Y1 .....3.70
Torrance,Calif. C11 ....4.40
Weirton,W.Va. W6 ....3.85
Youngstown R2, U5 ....3.70

BAR SIZE ANGLES; S. Shapes
Aliquippa,Pa. J5 .....3.70
Atlanta A11 .....4.25
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ..3.70
Niles,Calif. P1 .....5.05
Portland,Oreg. O4 ....4.65
SanFrancisco S7 .....4.85

BAR SIZE ANGLES; H.R.CARBON
Bethlehem,Pa. B2 .....3.90

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 .....4.30
Buffalo R2 .....4.30
Canton,O. R2 .....4.30
Canton,O.(29) T7 .....3.95
Clairton,Pa. U5 .....4.30
Detroit R7 .....4.45
Ecorse,Mich. G5 .....4.65
Fontana,Calif. K1 ....5.35
Gary,Ind. U5 .....4.30
Houston S5 .....4.70
Ind.Harbor,Ind. I-2, Y1.4.30
Johnstown,Pa. B2 .....4.30
KansasCity, Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.30
LosAngeles B3 .....5.35
Massillon,O. R2 .....4.30
Midland,Pa. C18 .....4.30
So.Chicago R2, U5, W14.4.30
So.Duquesne,Pa. U5 ....4.30
Struthers,O. Y1 .....4.30
Warren,O. C17 .....4.30
Youngstown U5 .....4.30

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 .....4.55
Gary,Ind. U5 .....4.55
Youngstown U5 .....4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.55
Bessemer,Ala. T2 .....5.55
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.55
Cleveland R2 .....5.55
Fairfield,Ala. T2 .....5.55
Fontana,Calif. K1 .....6.60
Gary,Ind. U5 .....5.55
Ind.Harbor,Ind. I-2 ....5.55
IndianaHarbor,Ind. Y1 ..6.05
Johnstown,Pa. B2 .....5.55
Lackawanna,N.Y. B2 ..5.55
Los Angeles B3 .....6.25
Pittsburgh J5 .....5.55
Seattle B3 .....6.30
So.Duquesne,Pa. U5 ....5.55
So.SanFrancisco B3 ....6.30
Struthers,O. Y1 .....6.05
Youngstown U5 .....5.55

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....4.55
BeaverFalls,Pa. M12, R2 4.55
Buffalo B5 .....4.60
Camden,N.J. P13 .....5.00
Carnegie,Pa. C12 .....4.55
Chicago W18 .....4.55
Cleveland A7, C20 .....4.55
Detroit P17 .....4.70
Donora,Pa. A7 .....4.55
Elyria,O. W8 .....4.55
FranklinPark,Ill. N5 ....4.55
Gary,Ind. R2 .....4.55
GreenBay,Wis. F7 .....4.55
Hammond,Ind. L2, M13.4.55
Hartford,Conn. R2 .....5.10
Harvey,Ill. B5 .....4.55
LosAngeles R2 .....6.00
Mansfield,Mass. B5 ....5.10
Massillon,O. R2, R8 ....4.55
Monaca,Pa. S17 .....4.55
Newark,N.J. W18 .....5.00
Plymouth,Mich. P5 .....4.80
Pittsburgh J5 .....4.55
Putnam,Conn. W18 .....5.10
Readville,Mass. C14 ....5.10
St.Louis,Mo. M5 .....4.95
So.Chicago,Ill. W14 ....4.55
SpringCity,Pa.(5) K3 ...5.00
Struthers,O. Y1 .....4.55
Waukegan,Ill. A7 .....4.55
Youngstown F3, Y1 ....4.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 .....5.40
BeaverFalls,Pa. M12 ....5.40
Bethlehem,Pa. B2 .....5.40
Buffalo B5 .....5.40
Camden,N.J. P13 .....5.80
Canton,O. R2 .....5.40
Canton,O.(29) T7 .....4.90
Carnegie,Pa. C12 .....5.40
Chicago W18 .....5.40
Cleveland A7 .....5.45
Cleveland C20 .....5.40
Detroit P17 .....5.55
Donora,Pa. A7 .....5.45
Elyria,O. W8 .....5.40
Gary,Ind. R2 .....5.40
Hammond,Ind. L2, M13..5.40
Hartford,Conn. R2 .....5.85
Harvey,Ill. B5 .....5.40
Lackawanna,N.Y. B2 ...5.40
Mansfield,Mass. B5 ....5.85
Massillon,O. R2, R8 ....5.40
Midland,Pa. C18 .....5.40
Monaca,Pa. S17 .....5.40
Newark,N.J. W18 .....5.75
Plymouth,Mich. P5 .....5.60
So.Chicago,Ill. R2, W14..5.40
Struthers,O. Y1 .....5.40
Warren,O. C17 .....5.40
Waukegan,Ill. A7 .....5.45
Worcester,Mass. A7 ....5.75
Youngstown F3, Y1 ....5.40

RAIL STEEL BARS
ChicagoHts.(3,4) C2 ...4.75
ChicagoHts.(3,4) I-2 ...4.75
Franklin,Pa.(3,4) F5 ...4.75
FortWorth,Tex.(26) T4..4.85
Huntngtn.W.Va.(3) W7..5.50
Marion,O.(3) P11 .....4.75
Moline,Ill.(3) R2 .....3.80
Tonawanda(3,4) B12 ....4.75
Williamsport(3) S19 ...5.00
Williamsport(4) S19 ...5.10

BARS, Wrought Iron
Dover,N.J.(Staybolt)U1 15.00
Dover(Eng.Bolt) U1 ..13.50
Dover(Wrght.Iron) U1 .12.25
Economy,Pa.(S.R.) B14..9.60
Economy,Pa.(D.R.)B14 11.90
Economy(Staybolt) B14 12.20
McK.Rks.(Staybolt)L5 14.50
McK.Rks(S.R.) L5 ....9.60
McK.Rks.(D.R.) L5 ...13.00

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ..3.70
Atlanta A11 .....4.25
Buffalo R2 .....3.70
Cleveland R2 .....3.70
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 ....4.40
Gary,Ind. U5 .....3.70
Houston S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
LosAngeles B3 .....4.40
Lackawanna,N.Y. B2 ..3.70
Milton,Pa. B6 .....4.55
Minnequa,Colo. C10 ....4.15
Monaca,Pa. S17 .....4.40
Newark,N.J. W18 .....5.75
Plymouth,Mich. P5 .....5.60
So.Chicago,Ill. R2, W14..5.40
Struthers,O. Y1 .....5.40
Warren,O. C17 .....5.40
Waukegan,Ill. A7 .....5.45
Worcester,Mass. A7 ....5.75
Youngstown F3, Y1 ....5.40

BARS, Reinforcing (Fabricated; to Consumers)
Huntington,W.Va. W7 ..5.50
Johnstown, ¼-1" B2 ...4.75
Los Angeles B3 .....5.45
Marion,O. P11 .....5.00
Seattle B3, N14 .....5.55
So.SanFrancisco B3 ....5.45
SparrowsPt. ¼-1" B2 ...4.75
Williamsport,Pa. S19 ...5.10

SHEETS, Hot-Rolled Steel
(18 gage and heavier)
AlabamaCity,Ala. R2 ..3.60
Ashland,Ky.(8) A10 ...3.60
Butler,Pa. A10 .....3.60
Cleveland J5, R2 .....3.60
Conshohocken,Pa. A3 ..4.00
Detroit, M1 .....4.40
Ecorse,Mich.(8) G5 ....3.80
Fairfield,Ala. T2 .....3.60
Fontana,Calif. K1 ....4.55
Gary,Ind. U5 .....3.60
Geneva,Utah C11 .....3.70
GraniteCity,Ill. G4 ....4.30
Ind.Harbor,Ind. I-2, Y1.3.60
Irvin,Pa. U5 .....3.60
Lackawanna,N.Y. B2 ..3.60
Munhall,Pa. U5 .....3.60
Niles,O. N12 .....5.25
Pittsburg,Calif. C11 ....4.30
Pittsburgh J5 .....3.60
Sharon,Pa. S3 .....4.00
So.Chicago,Ill. W14 ....3.60
SparrowsPoint,Md. B2 ..3.60
Steubenville,O. W10 ....3.60
Torrance,Calif. C11 ....4.30
Warren,O. R2 .....3.60
Weirton,W.Va. W6 ....3.60
WestLeechburg,Pa. A4 ..3.75
Youngstown U5, Y1 ....3.60

SHEETS, H.R. (19 gage)
AlabamaCity,Ala. R2 ...4.75
Dover,O. R1 .....5.65
Ind.Harbor,Ind. I-2 ....5.40
Mansfield,O. E6 .....5.65
Niles,O. N12 .....5.75
Torrance,Calif. C11 ....5.40

SHEETS, H.R. (14 ga., heavier)
High-Strength Low-Alloy
Cleveland J5, R2 .....5.40
Conshohocken,Pa. A3 ..5.65
Ecorse,Mich. G5 .....5.95
Fairfield,Ala. T2 .....5.40
Fontana,Calif. K1 ....6.35
Gary,Ind. U5 .....5.40
Ind.Harbor,Ind. I-2 ....5.40
Ind.Harbor,Ind. Y1 ....5.90
Irvin,Pa. U5 .....5.40
Lackawanna(35) B2 ....5.40
Pittsburgh J5 .....5.40
Sharon,Pa. S3 .....5.40
So.Chicago,Ill. U5 ....5.40
SparrowsPoint(36) B2 ..5.40
Warren,O. R2 .....5.40
Weirton,W.Va. W6 ....5.75
Youngstown U5 .....5.40
Youngstown Y1 .....5.90

SHEETS, Cold-Rolled
High-Strength Low-Alloy
Cleveland J5, R2 .....6.65
Ecorse,Mich. G5 .....7.10
Fontana,Calif. K1 ....7.50
Gary,Ind. U5 .....6.55
IndianaHarbor,Ind. Y1..7.05
IndianaHarbor,Ind. I-2..6.55
Irvin,Pa. U5 .....6.55
Lackawanna(37) B2 ....6.55
Pittsburgh J5 .....6.55
SparrowsPoint(38) B2..6.55
Warren,O. R2 .....6.55
Weirton,W.Va. W6 ....6.90
Youngstown Y1 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10 .....4.35
Cleveland J5 R2 .....4.35
Ecorse,Mich. G5 .....4.55
Fairfield,Ala. T2 .....4.35
Follansbee,W.Va. F4 ...5.35
Fontana,Calif. K1 .....5.30
Gary,Ind. U5 .....4.35
GraniteCity,Ill. G4 ....5.05
Ind.Harbor,Ind. I-2, Y1.4.35
Irvin,Pa. U5 .....4.35
Lackawanna,N.Y. B2 ..4.35
Middletown,O. A10 ....4.35
Pittsburg,Calif. C11 ....5.30
Pittsburgh J5 .....4.35
SparrowsPoint,Md. B2 ..4.35
Steubenville,O. W10 ....4.35
Warren,O. R2 .....4.35
Weirton,W.Va. W6 ....4.35
Youngstown Y1 .....4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala. R2 ..4.80
Ashland,Ky.(8) A10 ...4.80
Canton,O. R2 .....4.80
Dover,O. R1 .....5.50
Fairfield,Ala. T2 .....4.80
Gary,Ind. U5 .....4.80
Granite City,Ill. G4 ....5.50
Ind.Harbor,Ind. I-2 ....4.80
Irvin,Pa. U5 .....4.80
Kokomo,Ind.(13) C16 ..5.20
MartinsFerry,O. W10 ..4.80
Niles,O. N12 .....6.00
Pittsburg,Calif. C11 ...5.55
SparrowsPoint,Md. B2..4.80
Steubenville,O. W10 ....4.80
Torrance,Calif. C11 ....5.55
Weirton,W.Va. W6 ....4.80

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. U5 .....7.20
SparrowsPoint(39) B2 ..6.75

SHEETS, Galvannealed Steel

Canton,O. R2 .....5.35
Irvin,Pa. U5 .....5.35
Kokomo,Ind.(13) C16 ...5.75
Niles,O. N12 .....6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10 .....5.05
Middletown,O. A10 .....5.05

SHEETS, Electro Galvanized

Cleveland R2 (28) 5.65
Niles,O. R2 (28) 5.65
Weirton,W.Va. W6 ....5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind I-2 ....5.70

SHEETS, Drum Body

Pittsburg,Calif. C11 ....4.30
Torrance,Calif. C11 ....4.30

SHEETS, Well Casing

Fontana,Calif. K1 .....5.10

BLUED Stock, 29 ga.

Yorkville,O. W10 .....6.80
Follansbee,W.Va.(23)F4 6.85

SHEETS, Enameling Iron

Ashland,Ky.(8) A10 ....4.65
Cleveland R2 .....4.65
Gary,Ind. U5 .....4.65
GraniteCity,Ill. G4 ....5.35
Ind.Harbor,Ind. I-2 ....4.65
Irvin,Pa. U5 .....4.65
Middletown,O. A10 ....4.65
Youngstown Y1 .....4.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$6.25
Fairfield,Ala. T2 .....6.35
Gary,Ind. U5 .....6.25
GraniteCity,Ill. G4 ....6.45
Ind.Harbor, Ind. I-2 Y1.6.25
Irvin,Pa. U5 .....6.25
Niles,O. R2 .....6.25
Pittsburg,Calif. C11 ....7.00
SparrowsPoint,Md. B2 .6.35
Warren,O. R2 .....6.25
Weirton,W.Va. W6 ....6.25
Yorkville,O. W10 .....6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4 ...5.85
Gary,Ind U5 .....5.85
GraniteCity,Ill. G4 ....6.05
Ind.Harbor,Ind Y1 ....5.85
Irvin,Pa. U5 .....5.85
Yorkville,O. W10 .....6.15

SHEETS, Culvert No. 16	Cu Alloy	Cu Fe
Ashland,Ky. A10	5.60	...
Canton,O. R2	5.65	6.10
Fairfield,Ala T2.	5.60	5.85
Gary,Ind. U5	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo,Ind. C16.	6.25	...
MartinsFy,O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	...
SparrowsPt. B2	5.60	...
Torrance,Cal. C11	6.35	...

SHEETS, Culvert, No. 16 Pure Iron

Ashland,Ky. A10 .....5.85
Fairfield,Ala T2 .....5.85

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10 ...3.85
Cleveland R2 .....4.20
Ind.Harbor,Ind. I-2 ....3.85
Warren,O. R2 .....4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....4.95
Middletown,O. A10 ....4.85
Warren,O. R2 .....4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10 ...5.05
Canton,O. R2 .....5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10 .....5.30
Middletown,O. A10 ....5.30

SHEETS, ALUMINIZED

Butler,Pa. A10 .....8.15

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.55
SparrowsPoint,Md. B2	7.25	7.50	7.90
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (Cut Lengths ½c lower)	Field	Arma-ture	Elec-tric	Motor	Dyna-mo
BeechBottom W10 (cutlengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa. A4	...	...	7.75	9.00	9.80
GraniteCity,Ill. G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)	...	6.75	7.25	...	...
Vandergrift,Pa. U5	...	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	....	....	....
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	....	....	....
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	....	....	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

TINPLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$8.45	$8.70
Fairfield,Ala. T2	8.55	8.80
Gary,Ind. U5	8.45	8.70
Ind.Har. I-2, Y1.	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts.,Cal. C11	9.20	9.45
Sp.Pt.,Md. B2	8.55	8.80
Warren,O. R2	8.45	8.70
Weirton,W.Va.W6.	8.45	8.70
Yorkville,O. W10.	8.45	8.70

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2 .....$7.60
Gary,Ind. U5 .....7.50
Irvin,Pa. U5 .....7.50
SparrowsPoint,Md. B2 ..7.60
Yorkville,O. W10 .....7.50

SHEETS, LT. Coated Ternes, 6 lb

Yorkville,O. W10 .....$8.40

SHEET, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5 .....$9.50
Yorkville,O. W10 .....9.50

SHEET, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10	5.20
Gary,Ind. U5	5.20
Mansfield,O. E6	6.05
Middletown,O. A10	5.20
Niles,O. N12	6.00
Weirton,W.Va. W6	5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 .....5.60

ROOFING SHORT TERNES (8 lb Coated)

Gary,Ind. U5 .....9.50

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2 .....5.30
Conshohocken,Pa. A3 ...5.55
Ecorse,Mich. G5 .....5.95
Fairfield,Ala. T2 .....5.30
Fontana,Calif. K1 .....6.20
Gary,Ind. U5 .....5.30
Ind.Harb.,Ind. I-2 .....5.30
IndianaHarbor,Ind. Y1 ..5.80
Lackawanna,N.Y. B2 ..4.95
LosAngeles(25) B3 .....6.05
Seattle B3 .....6.30
Sharon,Pa. S3 .....5.40
So.SanFrancisco(25) B3.6.05
SparrowsPoint,Md. B2 ..4.95
Warren,O. R2 .....5.30
Weirton,W.Va. W6 .....5.75
Youngstown Y1 .....5.80
Youngstown U5 .....5.30

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland J5 .....6.70
Cleveland A7 .....6.55
Dover,O. G6 .....7.30
Fontana,Calif. K1 .....6.95
Lackawanna,N.Y. B2 ..6.40
Sharon,Pa. S3 .....6.55
SparrowsPoint,Md. B2 ..6.40
Warren,O. R2 .....6.55
Weirton,W.Va. W6 .....7.20
Youngstown Y1 .....7.05

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...3.50
Alton,Ill. L1 .....3.95
Ashland,Ky.(8) A10 ....3.50
Atlanta A11 .....4.05
Bessemer,Ala. T2 .....3.50
Bridgeprt,Conn.(10) S15.4.00
Buffalo(27) R2 .....3.50
Butler,Pa. A10 .....3.50
Carnegie,Pa. S18 .....4.00
Conshohocken,Pa. A3 ..3.90
Detroit M1 .....4.40
Ecorse,Mich. G5 .....3.80
Fairfield,Ala. T2 .....3.50
Fontana,Calif. K1 .....4.75
Gary,Ind. U5 .....3.50
Houston,Tex. S5 .....4.90
Ind.Harbor,Ind. I-2, Y1.3.50
Johnstown,Pa.(25) B2 ..3.50
KansasCity,Mo.(9) S5 ..4.10
Lackawanna,N.Y.(32)B2 3.50
LosAngeles B3 .....4.25
Milton,Pa. B6 .....4.35
Minnequa,Colo. C10 ....4.55
NewBritain(10) S15 ....4.00
No.Tonawanda,N.Y. B11 3.50
Pittsburg,Calif. C11 ...4.25
Riverdale,Ill. A1 .....3.50
SanFrancisco S7 .....4.85
Seattle B3, N14 .....4.50
Sharon,Pa. S3 .....4.00
So.Chicago,Ill. W14 ....3.50
So.SanFrancisco B3 ....4.25
SparrowsPoint,Md. B2 ..3.50
Torrance,Calif. C11 ....4.25
Warren,O. R2 .....3.50
Weirton,W.Va. W6 .....3.60
WestLeechburg,Pa. A4 ..3.75
Youngstown U5, Y1 ....3.50

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15.5.45
Carnegie,Pa. S18 .....5.85
Fontana,Calif. K1 .....6.70
Gary,Ind. U5 .....5.50
Houston,Tex. S5 .....5.90
KansasCity,Mo. S5 .....6.10

STRIP, Cold-Finished, Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea, O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	...	...	7.70	9.65	....
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	5.60	7.05	7.65	...	....
Detroit D2	5.60	6.65	7.25	...	....
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
FranklinPark,Ill. T6	5.00	6.60	7.55	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	....
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2	5.85	6.75	7.35	...	....
NewYork W3	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. N8:					
Cleve.orPitts.Base	...	6.80	7.40	9.35	11.65
Worcester,Mass.,Base	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.95
Youngstown C8	...	6.80	7.40	9.35	11.65

Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork W3	...	...	10.30	12.50	15.35

STRIP, Hot-Rolled Carbon

Midland,Pa. C18 .....5.85
NewBritn,Conn.(10) S15.5.45
Sharon,Pa. S3 .....5.85
Youngstown U5 .....5.50

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6 ..5.50
Berea,O. C7 .....6.60
Bridgeprt,Conn.(10) S15.5.35
Butler,Pa. A10 .....4.65
Cleveland A7, J5 .....4.65
Dearborn,Mich. D3 .....5.60
Detroit D2 .....5.60
Detroit M1 .....5.45
Dover,O.(40) G6 .....5.50
Ecorse,Mich. G5 .....4.85
Follansbee,W.Va. F4 ...5.35
Fontana,Calif. K1 .....6.30
FranklinPark,Ill.(40)T6 .4.90
Ind.Harbor,Ind. I-2 ....4.90
Lackawanna,N.Y. B2 ..4.65
LosAngeles C1 .....6.40
Mattapan,Mass. T6 .....5.50
Middletown,O. A10 ....4.65
NewBritain(10) S15 ....5.35
NewCastle,Pa. B4 .....5.35
NewCastle,Pa.(40) E5...5.25
NewHaven,Conn. D2 ...5.85
NewHaven,Conn. A7 ...5.15
Pawtucket,R.I. R3 ....6.00
Pawtucket,R.I.(21) N8..5.85
Riverdale,Ill.(40) A1 ...4.90
Rome,N.Y. R6 .....5.10
Sharon,Pa. S3 .....5.35
SparrowsPoint,Md. B2 ..4.65
Trenton,N.J. R5 .....6.00
Wallingford,Conn. W2 ..5.85
Warren,O.(40) T5 .....5.25
Warren,O. R2 .....4.65
Weirton,W.Va. W6 ....4.65
Youngstown C8 (40) ...5.25
Youngstown Y1 .....4.65

STRIP, Electro Galvanized

Dover,O. G6 .....5.50
Warren,O. T5 .....5.25
Weirton,W.Va. W6 .....4.65
Youngstown C8 .....5.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Corp.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire

G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div. Borg-Warner Corp.
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10)S15	10.75
Carnegie,Pa. S18	10.60
Cleveland A7	10.00
Dover,O. G6	10.50
Fontana,Calif. K1	11.65
Harrison,N.J. C18	10.60
Midland,Pa. C18	10.60
NewBritn,Conn.(10)S15	10.75
Pawtucket,R.I.(11) N8	10.75
Pawtucket,R.I.(12) N8	11.05
Sharon,Pa. S3	10.60
Worcester,Mass. A7	10.30
Youngstown C8	10.60

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.75
Warren,O. R2	4.10

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	5.25

TIGHT COOPERAGE HOOP

Atlanta A11	4.05
Riverdale,Ill. A1	3.90
Sharon,Pa. S3	4.15
Youngstown U5	3.75

WIRE, Tire Bead

Bartonville,Ill.(1) K4	10.90
Monessen,Pa. P16	11.40
Roebling,N.J. R5	11.55

WIRE, Merchant Quality

(6 to 8 gage)	An'ld.Galv.	
AlabamaCity R2	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19)K4	5.70	6.15
Buffalo W12	4.85	...
Cleveland A7	5.70	6.15
Crawfordsville M8	5.95	6.40
Donora,Pa. A7	5.70	6.15
Duluth,Minn. A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet,Ill. A7	5.70	6.15
KansasCy,Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen P7	5.95	6.40
Palmer W12	5.55	...
Pitts.,Calif. C11	6.65	6.80
Prtsmth.(18)P12	6.10	6.60
Rankin A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
SparrowsPt. B2	5.80	6.25
Sterling,Ill.(1)N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

ROPE WIRE

	(A)	(B)
Alton,Ill. L1	8.65	8.90
Bartonville,Ill. K4	8.55	8.80
Buffalo W12	8.55	8.80
Fostoria,O. S1	8.85	9.10
Johnstown,Pa. B2	8.55	8.80
Monessen,Pa. P16	8.55	8.80
Monessen,Pa. P7	8.80	9.05
Muncie,Ind. I-7	8.75	9.00
Palmer,Mass. W12	8.85	9.10
Portsmouth,O. P12	8.55	8.80
Roebling,N.J. R5	8.85	9.10
SparrowsPt. B2	8.65	8.90
Struthers,O. Y1	8.55	8.80
Worcester J4, T6	8.85	9.10

(A) Plow and Mild Plow.
(B) Improved Plow.

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	4.85
Aliquippa,Pa. J5	4.85
Atlanta A11	5.10
Alton,Ill. L1	5.05
Bartonville,Ill.(1) K4	4.85
Buffalo W12	4.85
Chicago W13	5.10
Cleveland A7, C20	4.85
Crawfordsville,Ind. M8	5.10
Donora,Pa. A7	4.85
Duluth,Minn. A7	4.85
Fairfield,Ala. T2	4.85
Fostoria,O.(24) S1	5.35
Houston S5	5.25
Johnstown,Pa. B2	4.85
Joliet,Ill. A7	4.85
KansasCity,Mo. S5	5.45
Kokomo,Ind. C16	4.95
LosAngeles B3	5.80
Minnequa,Colo. C10	5.10
Monessen,Pa. P7	5.10
Newark 6-8 ga. I-1	5.50
No.Tonawanda B11	4.85
Palmer,Mass. W12	5.15
Pittsburg,Calif. C11	5.80
Portsmouth,O. P12	5.25
Rankin,Pa. A7	4.85
So.Chicago,Ill. R2	4.85
So.SanFrancisco C10	5.80
SparrowsPoint,Md. B2	4.95
Sterling,Ill.(1) N15	4.85
Struthers,O. Y1	4.85
Torrance,Calif. C11	5.80
Waukegan,Ill. A7	4.85
Worcester,Mass. A7, T6	5.15

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	6.20
Buffalo W12	6.35
Cleveland A7	5.85
Crawfordsville,Ind. M8	6.20
Detroit D2	6.20
Dover,O. G6	6.20
Fostoria,O. S1	6.00
Kokomo,Ind. C16	5.70
FranklinPark,Ill. T6	6.20
Massillon,O. R8	5.85
Monessen,Pa. P16	5.85
Monessen,Pa. P7	6.10
NewHaven,Conn. D2	6.50
Pawtucket,R.I.(12) N8	6.85
Trenton,N.J. R5	6.15
Worcester,Mass. A7	6.15
Worcester,Mass. T6	6.50
Worcester,Mass. W12	6.65

WIRE, Galv'd ACSR for Cores

Bartonville,Ill. K4	8.50
Monessen,Pa. P16	8.50
Muncie,Ind. I-7	8.70
Roebling,N.J. R5	8.80
SparrowsPoint,Md. B2	8.60
Johnstown,Pa. B2	8.50

WIRE (16 gage)	An'ld.Galv. Stone	Stone
Aliquippa J5	10.15	12.15
Bartonville(1)K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsville M8	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown B2	10.25	12.15
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass. W12	10.25	12.15
Pitts.Cal. C11	10.60	12.50
Prtsmth.(18) P12	10.55	12.30
SparrowsPt. B2	10.35	12.25
Waukegan A7	10.25	12.15

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	6.25
Alton,Ill. L1	6.45
Bartonville,Ill.(1) K4	6.25
Buffalo W12	6.25
Cleveland A7	6.25
Donora,Pa. A7	6.25
Duluth,Minn. A7	6.25
Fostoria,O. S1	6.25
Johnstown,Pa. B2	6.25
LosAngeles B3	7.20
Milbury,Mass.(12) N6	8.05
Monessen,Pa. P7, P16	6.25
Muncie,Ind. I-7	6.45
Palmer,Mass. W12	6.55
Pittsburg,Calif. C11	7.20
Roebling,N.J. R5	6.55
Portsmouth,O. P12	6.25
So.Chicago,Ill. R2	6.25
So.SanFrancisco C10	7.20
SparrowsPoint,Md. B2	6.35
Struthers,O. Y1	6.25
Trenton,N.J. A7	6.55
Waukegan,Ill. A7	6.25
Worcester A7, T6, W12	6.55
Worcester,Mass. J4	6.75

WIRE, Fine & Weaving (8"Coils)

Bartonville,Ill.(1) K4	8.90
Buffalo W12	8.90
Chicago W13	8.90
Cleveland A7	8.90
Crawfordsville,Ind. M8	8.95
Fostoria,O. S1	8.90
Johnstown,Pa. B2	8.90
Kokomo,Ind. C16	8.90
Monessen,Pa. P16	8.90
Muncie,Ind. I-7	9.10
Palmer,Mass. W12	9.20
Portsmouth,O. P12	8.90
Roebling,N.J. R5	9.20
Waukegan,Ill. A7	8.90
Worcester,Mass. A7, T6	9.20

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	137
Aliquippa,Pa. J5	141
Atlanta A11	144
Bartonville,Ill.(19) K4	144
Crawfordsville,Ind. M8	146
Donora,Pa. A7	141
Duluth,Minn. A7	141
Fairfield,Ala. T2	141
Houston,Tex. S5	149
Johnstown,Pa. B2	141
Joliet,Ill. A7	141
KansasCity,Mo. S5	153
Kokomo,Ind. C16	143
Minnequa,Colo. C10	147
Monessen,Pa. P7	146
Pittsburg,Calif. C11	161
Portsmouth,O.(18) P12	148
Rankin,Pa. A7	141
So.Chicago,Ill. R2	137
So.SanFran.,Calif. C10	161
SparrowsPoint,Md. B2	143
Sterling,Ill.(1) N15	141

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	123
Atlanta A11	126
Bartonville,Ill.(19) K4	123
Crawfordsville,Ind. M8	132
Donora,Pa. A7	123
Duluth,Minn. A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	128
Pittsburg,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.90
Alton,Ill. L1	6.10
Buffalo W12	5.90
Cleveland A7	5.90
Donora,Pa. A7	5.90
Duluth,Minn. A7	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Monessen,Pa. P7, P16	5.90
NewHaven,Conn. A7	6.20
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
So.SanFrancisco C10	6.85
SparrowsPoint,Md. B2	6.00
Torrance,Calif. C11	6.85
Trenton,N.J. A7	6.20
Waukegan,Ill. A7	5.90
Worcester,Mass. A7	6.20

WOVEN FENCE, 9-15½Ga. Col.

AlabamaCity,Ala. R2	127
Ala.City,Ala.,17-18ga.R2	214
Aliquippa,Pa.9-14½ga.J5	131
Atlanta A11	134
Bartonville,Ill.(19) K4	131
Crawfordsville,Ind. M8	133
Donora,Pa. A7	131
Duluth,Minn. A7	131
Fairfield,Ala. T2	131
Houston,Tex. S5	139
Johnstown,Pa. B2	131
Johnstown,17ga.,6" B2	205
Johnstown,17ga.,4" B2	208
Joliet,Ill. A7	131
KansasCity,Mo. S5	143
Kokomo,Ind. C16	133
Minnequa,Colo. C10	139
Monessen,Pa. P7	136
Pittsburg,Calif. C11	154
Portsmouth,O.(18) P12	138
Rankin,Pa. A7	131
So.Chicago,Ill. R2	127
Sterling,Ill.(1) N15	131

FENCE POSTS

ChicagoHts.,Ill. C2	140
Duluth,Minn. A7	125
Franklin,Pa. F5	140
Huntington,W.Va. W7	140
Johnstown,Pa. B2	140
Marion,O. P11	140
Minnequa,Colo. C10	130
Moline,Ill. R2	136
So.Chicago,Ill. R2	140
Tonawanda,N.Y. B12	140
Williamsport,Pa. S19	150

TRACK BOLTS (20) Treated

KansasCity,Mo. S5	9.85
Lebanon,Pa.(31) B2	9.85
Minnequa,Colo. C10	9.85
Pittsburgh O3, P14	9.85
Seattle B3	10.35

NAILS & STAPLES, Stock

To dealers & mfrs. (7)	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa.(13) J5	118
Atlanta A11	121
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	118
Cleveland A9	125
Crawfordsville,Ind. M8	122
Donora,Pa. A7	118
Duluth,Minn. A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S5	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill.(1) N15	118
Torrance,Calif. C11	138
Worcester,Mass. A7	124

NAILS, Cut (100 lb keg)

To dealers (33)	
Conshohocken,Pa. A3	$7.35
Wheeling,W.Va. W10	7.35

TIE PLATES

Fairfield,Ala. T2	4.50
Gary,Ind. U5	4.50
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.50
Minnequa,Colo. C10	4.50
Pittsburg,Calif. C11	4.65
Seattle B3	4.65
Steelton,Pa. B2	4.50
Torrance,Calif. C11	4.65

JOINT BARS

Bessemer,Pa. U5	4.70
Fairfield,Ala. T2	4.70
Ind.Harbor,Ind. I-2	4.70
Joliet,Ill. U5	4.70
Lackawanna,N.Y. B2	4.70
Minnequa,Colo. C10	4.70
Steelton,Pa. B2	4.70

STANDARD TRACK SPIKES

Ind.Harbor,Ind. I-2, Y1	6.15
KansasCity,Mo. S5	6.40
Lebanon,Pa. B2	6.15
Minnequa,Colo. C10	6.15
Pittsburgh J5	6.15
Seattle B3	6.65
So.Chicago,Ill. R2	6.15
Struthers,O. Y1	6.15
Youngstown R2	6.15

AXLES

Ind.Harbor,Ind. S13	5.60
Johnstown,Pa. B2	5.60

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	...	4.00
Fairfield,Ala. T2	...	...	...	4.00
Gary,Ind. U5	3.60	3.50	3.55	...
Huntington,W.Va. W7	...	...	...	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	...
Johnstown,Pa. B2	...	...	...(16)	4.00
Lackawanna,N.Y. B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	...
Williamsport,Pa. S19	...	...	...	4.75

TOOL STEEL

Grade	$ per lb
Regular Carbon	0.230
Extra Carbon	0.270
Special Carbon	0.325
Oil Hardening	0.350
5% Cr Hot Work	0.350
Hi-Carbon-Cr	0.635

Grade by Analysis

W	Cr	V	Co	
18	4	1	....	1.505
18	4	2	....	1.650
20.25	4.25	1.6	12.25	3.535-3.675
19	4	2	7	2.460
18.25	4.25	1	4.75	2.125
18	4	2	9	2.445-2.45
13.5	4	3	....	1.6025

W	Cr	V	Mo	
6.4	4.5	19.5	5	0.96-0.965
6	4	3	6	1.190
1.5	4	1	8.5	0.810

Tool steel products include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2 and V3.

Footnotes:

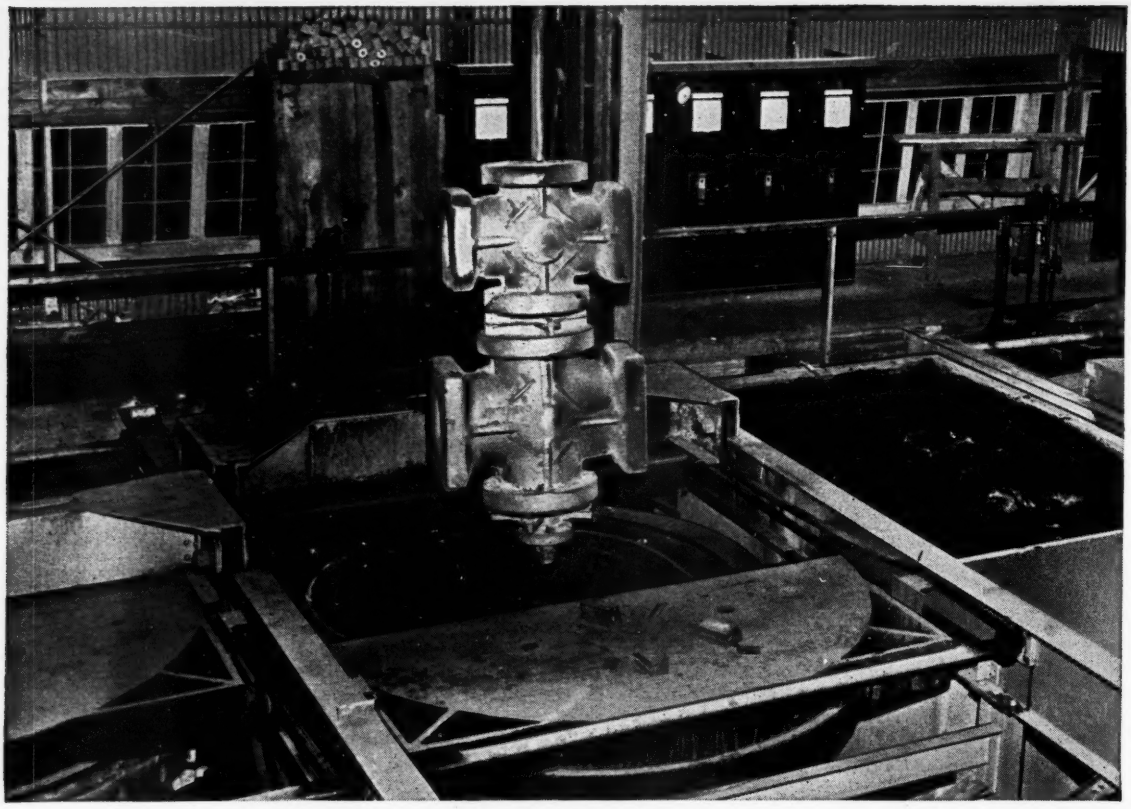
(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(5) Philadelphia del.
(4) Reinforcing.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga. & heavier.
(14) Also wide flange beams.
(15) ¼" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25c off for untreated.
(21) New Haven, Conn., base.
(22) Del. San Francisco Bay area.
(23) 28 Ga. 36" wide.
(24) Deduct 0.20c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, mill lengths, to fabricators; to consumers, 5.60c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared; add 0.35c for universal mill.
(31) Not annealed.
(32) Rd. or square edge.
(33) To jobbers, deduct 20c.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter: 66"
(38) 14 gage & lighter: 48" & narrower.
(39) 48" and narrower. & narrower.
(40) Lighter than 0.035"; 0.035" and heavier. 0.25c higher.

Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Div.
N5 Nelsen Steel & Wire Co.
N6 NewEng-HighCarb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Div.
N14 Nrthwst. Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S24 Seidelhuber Steel
T2 Tenn. Coal & Iron Div.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.
V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet&Tube



Part of heat-treating dept., Texas Electric Steel Casting Co., Houston. Valve body casting leaving furnace after slow cooling. All furnace temperatures are controlled by Micromax instruments in background.

Round-the-clock Heat treatment?

Tesco does it under Micromax control

Twenty years experience in the manufacture of heavy castings gives the Texas Electric Steel Casting Co. a vast store of information about all kinds of heat-treating equipment. And one fact this experience clearly shows is that they can rely on Micromax automatic control to back them up every time . . . even when they must hold temperature to a ± 10 F tolerance!

Tesco has found Micromax dependability especially valuable in 24-hour, 7-day-a-week operation. Its automatic standardizing protects the basic accuracy of the entire instrument, removing all need for everyday adjustment. Its micro-responsive control anticipates changes, regardless of cause, and heads off their effect, so as to hold heating, soaking and cooling temperatures as specified.

This smoother performance is available for all furnaces—car-bottom and vertical, such as Tesco's . . . continuous furnaces . . . controlled atmosphere installations; and for practically *any* product where uniformity and *economy* are important.

In solving such problems, you may select Micromax instruments, as Tesco did, or Speedomax electronic recording controllers. Both instruments are available in either the strip chart or round chart form. Both can provide any control action needed.

Our representative will be glad to help you investigate the instrumentation for proper control of your heat-treating problems. Write our nearest office or 4957 Stenton Ave., Phila. 44, Penna., for catalogs and information.

LEEDS & NORTHRUP CO.

INSTRUMENTS • AUTOMATIC CONTROLS • FURNACES

Jrl Ad ND44-33-620(3)

STANDARD PIPE, T & C

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % —Black— A	B	C	—Galvanized— D	E	F
⅛	5.5c	0.24	34.0	32.0	...	+0.5	+2.5	...
¼	6.0	0.42	28.5	26.5	...	+3.5	+5.5	...
⅜	6.0	0.57	23.5	21.5	...	+10.0	+12.0	...
½	8.5	0.85	36.0	34.0	35.0	12.0	10.0	11.0
¾	11.5	1.18	39.0	37.0	38.0	16.0	14.0	15.0
1	17.0	1.68	41.5	39.5	40.5	19.5	17.5	18.5
1¼	23.0	2.28	42.0	40.0	41.0	20.5	18.5	19.5
1½	27.5	2.78	42.5	40.5	41.5	21.5	19.5	20.5
2	37	3.68	43.0	41.0	42.0	22.0	20.0	21.0
2½	58.5	5.82	43.5	41.5	42.5	23.0	21.0	22.0
3	76.5	7.62	43.5	41.5	42.5	23.0	21.0	22.0

Column A: Etna, Pa. N2 and 36½ % on 3½", 4"; Butler, Pa. ⅛-¾", F6; Benwood, W. Va., 3½ points lower on ⅛", 1½ points lower on ¼", and 2 points lower on ⅜", W10; Sharon, Pa. M6, 1 point higher on ⅛", 2 points lower on ¼" and ⅜"; Wheatland, Pa. W9, 2 points lower on ⅛", ¼", ⅜". Following make ½" and larger: Lorain, O. N3; Youngstown R2 and 36¼ % on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5; Fontana, Calif. K1 quotes 11½ points lower on ½" and larger continuous weld and 24% on 3½" and 4".
Columns B & E: Sparrows Point, Md. B2.
Columns C & F: Indiana Harbor, Ind., Y1; Alton, Ill., (Gary base) 2 points lower discount L1.
Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 4% on ⅛", plus 6% on ¼", plus 13% on ⅜" and 15.5% on 3½", 4"; Sharon, Pa. M6, plus 2.5 on ⅛", 1 point lower on ½", ¾", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3"; Wheatland, Pa. W9, add 2 points on ⅛", ¼", ⅜", 1 point lower on ¾", 2 points lower on 1", 1½", 2", 1½ points lower on 1¼", 2½", 3". Etna, Pa. N2 and 15.5% on 3½", 4". Following quote only on ½" and larger: Lorain, O. N3; Youngstown R2, and 15½ % on 3½" and 4"; Youngstown Y1, Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1¼", 2", 1½ points lower on 1¼", 2½" and 3".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Galv. B	Elec. Weld Black C	Galv. D
2	37.0c	3.68	29.5	8.0	29.5	8.0
2½	58.5	5.82	32.5	11.5	32.5	11.5
3	76.5	7.62	32.5	11.5	32.5	11.5
3½	92.0	9.20	34.5	13.5	34.5	13.5
4	$1.09	10.89	34.5	13.5	34.5	13.5
5	1.48	14.81	37.0	16.0	37.0	16.0
6	1.92	19.18	37.0	16.0	37.0	16.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.
Column B: Aliquippa J5 quotes 1¼ pts lower on 2", 1 pt lower on 2½-6-in.; Lorain N3; Youngstown Y1.
Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft., mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B W. Ga.	—Seamless— H.R.	C.D.	Elec. Weld H.R.	C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1¾	13	19.29	23.62	19.62	23.09
2	13	21.62	26.48	21.99	25.86
2¼	13	24.35	29.82	24.50	28.84
2¼	12	26.92	32.97	26.98	31.76
2½	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding Stainless	— Plates — Carbon Base 10%	20%	—Strip— Cold-Rolled Carbon Base 10%	Both Sides	—Sheets— Carbon Base 10%	20%	Cu Base Both Sides
302 ...	....	....	....	....	19.75	26.24–27.50	77.00
304 ...	25.00	29.50	....	....	24.50	27.50–27.77	77.00
309 ...	30.50	35.00	....	....	....	....	....
310 ...	36.50	41.00	....	....	....	....	144.00
316 ...	29.50	34.00	....	....	26.00	35.92–36.50	....
317 ...	34.50	39.00	....	....	....	....	....
318 ...	33.50	38.00	....	....	....	....	....
321 ...	26.50	31.00–32.00	....	....	23.00	33.00	111.00
347 ...	27.50	32.00	....	....	24.00	33.50–33.83	130.00
405 ...	21.25	27.75	....	....	....	....	....
410 ...	20.75	27.25	....	....	....	....	....
Nickel.	23.55	45.15	41.00	54.00	....	....	....
Inconel.	41.23	54.18	....	....	....	....	165.00
Monel..	34.93	46.28	....	....	....	....	....
Copper*	....	....	23.70†	29.65‡	....	....	....

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; nickel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS
(F.o.b. midwestern plants; per cent off list for less than case lots to consumers
6 in. and shorter:
½-in. & smaller diam. 15
⅝-in. & ⅝-in. 18.5
¾-in. and larger ... 17.5
Longer than 6 in.:
All diams. 14
Lag bolts, all diams.:
6 in and shorter ... 23
over 6 in. long 21
Ribbed Necked Carriage 18.5
Blank 34
Plow 34
Step, Elevator, Tap and Sleigh Shoe 21
Tire bolts 12
Boiler & Fitting-Up Bolts 31

NUTS

H.P. & C.P.	Reg.	Hvy.
Square:		
½-in. & smaller	15	15
⅝-in. & ⅝-in. .	12	6.5
¾-in.-1½-in. ..	9	1
1⅝-in. & larger	7.5	1
H.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅝-in. .	16.5	6.5
¾-in.-1½-in. ..	12	2
1⅝-in. & larger	8.5	2
C.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅝-in. .	23	17.5
¾-in. & 1½-in.	19.5	12
1⅝-in. & larger	12	6.5

SEMIFINISHED NUTS
American Standard
(Per cent off list for less than case or keg quantities)

	Reg.	Hvy.
½-in. & smaller..	35	28.5
⅝-in. & ⅝-in. ..	29.5	22
¾-in.-1½-in.	24	15
1⅝-in. & larger..	13	8.5
		Light
¼-in. & smaller		35
½-in. to ⅝-in.		28.5
¾-in. to 1½-in.		26

STEEL STOVE BOLTS
(F.o.b. plant; per cent off list in packages)
Plain finish .....48 & 10
Plated finishes .....31 & 10

HEXAGON CAP SCREWS
(1020 steel; packaged: per cent off list)
6 in. or shorter:
⅝-in. & smaller 42
¾-in. through 1 in. . 34
Longer than 6 in.:
⅝-in. & smaller 26
¾-in. through 1 in. . 4

SQUARE HEAD SET SCREWS
(Packaged; per cent off list)
No. 10 and smaller 35
¼-in. diam. & larger .. 16
N.F. thread, all diams. 10

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 7.85c
½-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers—List to list-plus-$1

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 70%, $43; 60%, $40.
Imported, net ton, duty paid, metallurgical grade, $33-$35.

ELECTRODES

(Threaded, with nipples, unboxed f.o.b. plant)

GRAPHITE

Diam.	Inches — Length	Cents per lb
17,18,20	60,72	17.85
8 to 16	48,60,72	17.85
7	48,60	19.57
6	48,60	20.95

CARBON

35,40	110	8.03
30	65,84,110	8.03
24	72 to 104	8.03
17 to 20	34,90	8.03

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	41.00	34.00	31.25
302...	41.25	36.75	31.50
303...	43.25	40.25	34.00
304...	43.25	38.75	33.00
309...	56.00	55.00	44.75
316...	57.00	59.00	49.25
321...	49.25	48.25	37.00
347...	53.75	52.25	41.50
410...	36.50	30.50	25.75
416...	37.00	37.00	26.25
502...	28.50	27.00	15.25
420...	44.00	47.00	31.25
430...	39.00	31.00	26.25
501...	27.50	26.00	14.25

Balt., Types 301-347 sheet, except 303 and 309 E2.
Brackenridge, Pa., sheets A4 quotes slight variations on Types 301-347.
Bridgeville, Pa., bars, wire, sheets & strip U4.
Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502, A10.
Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502 S18.
Cleveland, strip A7.
Detroit, strip M1 quotes 34.00c on Type 301; 36.50c, 302; 38.50c, 304; 58.50c, 316; 52.00c, 347; 30.50c, 410; 31.00c, 430.
Dunkirk, N. Y., bars, wire A4 quotes slight variations on Types 301-347.
Duquesne, Pa., bars U5.
Fort Wayne, Ind., bars and wire, except Types 501 & 502 J6 quotes slight variations on Types 301-347.
Gary, Ind., sheets except Type 416 U5.
Harrison, N. J., strip and wire C18.
Massillon, O., all items, R2.
McKeesport, Pa., strip, Type 410; bars & wire, Types 410 through 430 and 31.25c on Type 302, 33.75c on 303, 32.75c on 304, 48.75c on 316, 36.75c on 321, 41.25c on 347 F2.
McKeesport, Pa., bars, sheets except Type 416 U5.
Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.
Midland, sheets & strip C18.
Munhall, Pa., bars U5.
Muncie, Ind., wire I-7 quotes types 302, 304, 430.
Pittsburgh, sheets C18.
Reading, Pa., strip except 34.25c on Type 301 and 56.00c on 309; bars, except 31.50c on Type 301 and 45.25c on 309 C4.
Sharon, Pa., strip, except Types 303, 309, 416, 501, 502 and 34.25c on Type 301 S3.
So. Chicago, Ill., bars & structurals U5.
Syracuse, N. Y., bars, wire & structurals C18.
Titusville, Pa., bars U4.
Wallingford, Conn., strip W2 quotes 0.25c higher.
Washington, Pa., bars, sheets & strip, except 0.25c higher on Type 301 J3.
Washington, Pa., Types 301 through 347 sheets & strip except 303, 309; 316 sheets 62.00c, strip 64.00c W4.
Watervliet, N. Y., structurals & bars A4 quotes variations on Types 301-347.
Waukegan, bars & wire A7.
West Leechburg, Pa., strip, A4 quotes slight variations on Types 301-347.
Youngstown, strip except Types 303, 309, 316, 416, 501 and 502 and 34.25c on Type 301 C8.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 30.00-35.00
Toluol, one deg...26.00-33.00
Industrial xylol ..25.00-33.50

Per ton bulk ovens
Sulphate of ammonia.$32-$45
Cents per pound, ovens
Phenol, 40 (carlots, non-returnable drums) ...17.25

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

	Cents
Sponge iron	
98+ % Fe, carlots..	17.00
Swedish, c.i.f. New York, in bags..8.85-9.95	
Electrolytic iron:	
Annealed, 99.5% Fe.	42.50
Unannealed (99 + % Fe)	36.50
Unannealed, 99 + % Fe (minus 325 mesh)	53.50
Powder Flakes	48.50
Carbonyl Iron:	
97.9-99.8% size 5 to 10 microns ..83.00-148.00	
Aluminum:	
Carlots, freight allowed	29.50
Atomized, 500 lb drums, freight allowed	32.50
Antimony	75.85
Brass, 20-ton lots..30.00-33.25	
Bronze, 10-ton lots 51.25-60.00	
Phosphor - Copper, 20-ton lots	50.00
Copper:	
Electrolytic	37.25
Reduced	33.75
Lead	26.30
Magnesium 75.00-85.00	
Manganese:	
Minus 100 mesh	57.00
Minus 35 mesh	52.00
Minus 200 mesh	62.00
Nickel unannealed	86.00
Nickel-Silver 5-ton lots	45.00
Silicon	38.50
Solder (plus cost of metal)	8.50
Stainless Steel, 302 ...	83.00
Zinc, 10-ton lots..25.00-32.50	
Tungsten	Dollars
Melting grade, 99% 60 to 200 mesh:	
1000 lb and over....	6.00
Less than 1000 lb ..	6.15
98.8% minus 65 mesh:	
1000 lb and over....	4.15
Less than 1000 lb ..	4.25
Molybdenum:	
99.9%, minus 200 mesh	3.24
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price net ton

BEEHIVE OVENS

Connellsvil.fur. .$14.50-15.00
Connellsvil.fdy. ..17.00-18.00
New River foundry... 21.30
Wise county, foundry.. 15.95
Wise county, furnace.. 15.20

OVEN FOUNDRY COKE

Kearney, N. J. ovens.$22.75
Everett, Mass., ovens New England, del..*24.80
Chicago ovens 23.00
Chicago, del. 24.50
Terre Haute, ovens.... 22.50
Milwaukee, ovens 23.75
Indianapolis, ovens ... 22.75
Chicago, del. 26.42
Cincinnati, del. 25.85
Detroit, del. 26.85
Ironton, O., ovens 22.50
Cincinnati, del. 25.12
Painesville, O., ovens. 24.00
Cleveland, del. 25.82
Erie, Pa., ovens 23.50
Birmingham, ovens .. 20.30
Birmingham, del. ... 21.60
Philadelphia, ovens ... 22.70
Neville Island, Pa., ovens 23.00
Swedeland, Pa., ovens. 22.60
St. Louis, ovens
St. Louis, del. 25.40
Portsmouth, O., ovens 22.50
Cincinnati, del. 25.12
Detroit, ovens 24.00
Detroit, del. 25.00
Buffalo, del. 26.89
Flint, del. 26.59
Pontiac, del. 25.47
Saginaw, del. 26.92

* Or within $4.55 freight zone from works.

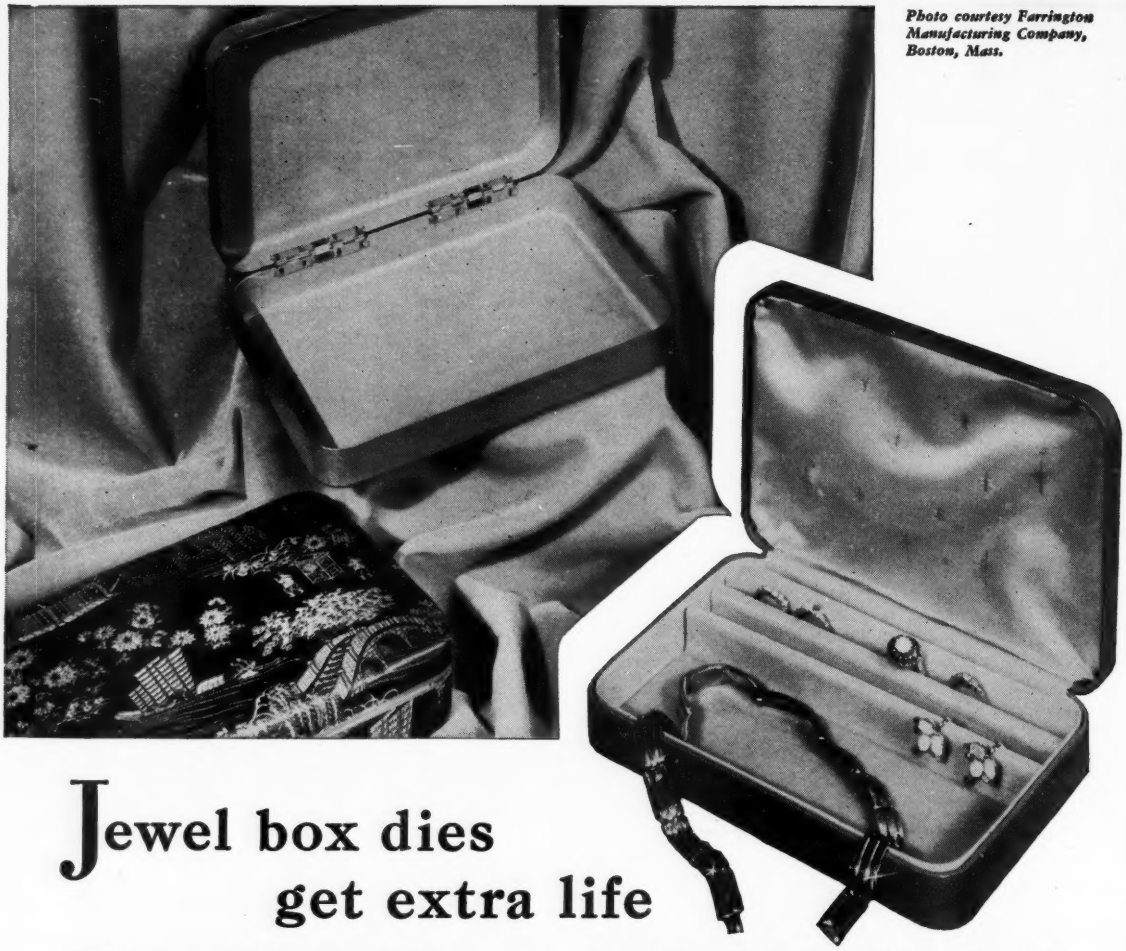


Photo courtesy Farrington Manufacturing Company, Boston, Mass.

Jewel box dies get extra life

"Fabulous Beauty Fashioned by Farrington," is the slogan used by Farrington Manufacturing Company, Boston, to describe brocade- and leatherette-covered jewel boxes and product packages.

Shells for many higher-quality Farrington boxes are stamped from Republic Electro Paintlok and Electro Zincbond. These zinc-coated, chemically-treated steel sheets originally were developed to *take* and *hold* paints, lacquers, and synthetic enamels. They do that job well.

And, Farrington Manufacturing Company finds that they offer four more distinct advantages in the production of fabric-covered and lined boxes:

1. ***Extra die life***—up to four times the production between grinds—because their tight zinc coating acts as an effective die lubricant.
2. ***Protect exterior beauty:*** the zinc coating retards rusting action which would "blister" brocade and leatherette coverings.
3. ***Protect satin linings*** against interior rust stains.
4. ***Offer improved adhesion*** for the latex which binds coverings to shell.

Republic Electro Paintlok and Electro Zincbond offer other worthwhile advantages to all manufacturers of painted or enameled steel products. Their full story is colorfully detailed in Republic Booklet 525. Write for your *free* copy today. Address:

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

Republic
REPUBLIC STEEL
ELECTRO ZINC PLATED SHEETS
Electro Paintlok · Electro Zincbond

Other Republic Products include Carbon, Alloy and Stainless Steels—Sheets, Strip, Plates, Bars, Pipe, Tubing, Bolts and Nuts, Wire

WAREHOUSE STEEL PRODUCTS

(Representative prices, cents per pound, for delivery within switching limits, subject to extras.)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140‡§		Carbon	Floor
New York (city)	6.28	7.24	8.54	6.50	...	6.52	7.33	9.29	6.38	6.76	8.01
JerseyCty(c'try)	6.09	6.94	8.27	6.36	...	6.22	7.03	8.99	6.08	6.46	7.71
Boston (city) ..	6.40	7.20	8.63	6.32	...	6.25	7.24	10.80	6.40	6.60	7.84
Boston (c'try)..	6.20	7.00	8.43	6.12	...	6.05	7.04	10.60	6.20	6.40	7.64
Phila. (city) ...	6.04	6.97	8.35	6.29	7.11	6.29	7.16	10.48	6.10	6.38	7.29
Phila. (c'try) ..	5.79	6.72	8.10	6.04	6.86	6.04	6.91	10.23	5.85	6.13	7.04
Balt. (city) ...	5.74	7.00	8.40	6.23	...	6.21	6.83	...	6.33	6.33	7.57
Balt. (c'try) ..	5.54	6.80	8.20	6.03	...	6.01	6.63	...	6.13	6.13	7.37
Norfolk, Va. ...	6.78	...	...	...	...	6.04	7.30	...	6.30	6.30	7.15
Richmond, Va. .	5.74	6.57	8.38	6.14	...	5.91	6.59	...	6.72	6.86	8.00
Wash. (w'hse) .	6.05	7.26	8.49	6.50	...	6.50	7.26	...	6.60	6.65	7.86
Buffalo (del.)..	5.74	6.52	8.46	6.06	...	5.72	6.65	10.72††‖	6.02	6.18	7.55
Buffalo (w'hse).	5.54	6.32	8.26	5.86	...	5.52	6.45	10.52††	5.82	5.98	7.35
Pitts. (w'hse)..	5.54	6.32	8.25	5.84	6.90	5.47	6.40	10.10††	5.65	5.70	6.69
Detroit (w'hse).	5.74	6.49	8.55	5.78	7.15	5.76	6.60	10.37††	6.12	6.17	7.23
Cleveland (del.)	5.74	6.52	8.18	5.85	7.14	5.81	6.60	10.41††	6.18	6.02	7.43
Cleve. (w'hse) .	5.54	6.32	7.98	5.65	6.94	5.61	6.40	10.21††	5.98	5.82	7.23
Cincin. (w'hse).	5.87	6.39	8.32	5.79	...	5.77	6.66	10.52††	6.12	6.17	7.31
Chicago (city)..	5.74	6.52	8.05	5.69	...	5.67	6.50	10.30††	5.85	5.90	7.09
Chicago (w'hse)	5.54	6.32	7.85	5.49	...	5.47	6.30	10.10††	5.65	5.70	6.89
Milwau. (city) .	5.91	...	8.22	5.86	...	5.84	6.77	10.37††	6.02	6.07	7.26
Milwau. (c'try).	5.71	...	8.02	5.66	...	5.64	6.57	10.17††	5.82	5.87	7.06
St. Louis (del.)	6.04	6.82	8.35	5.99	...	5.97	6.90	10.60††	6.25	6.30	7.49
St. L. (w'hse) .	5.84	6.62	8.15	5.79	...	5.77	6.70	10.40††	6.05	6.10	7.29
Kans. City(city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
Kans.Cty(w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
Birm'hm (city).	5.75	6.55	6.90[2]	5.70	...	5.70	7.53	...	5.85	6.10	8.23
Birm'hm(w'hse)	5.60	6.40	6.75[2]	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Los Ang. (city).	6.50	8.30[3]	9.50	6.60	10.65	6.45	8.35	11.50††	6.50	6.50	8.75
L. A. (w'hse)..	6.30	8.10[3]	9.30	6.40	10.45	6.25	8.15	11.30††	6.30	6.30	8.55
Seattle-Tacoma.	7.01	9.18	9.65	7.55	...	6.80	9.14	10.35	6.57	6.95	8.73
SanFran.(w'hse)	6.44	7.88[2]	9.25[2]	6.45	...	6.41	8.20	11.30	6.25	6.38	8.45

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); ‡ includes extra for 10 gage; § as rolled; ** 16 gage; †† as annealed; §§ 15 gage. Base quantities, 2000 to 9999 lb except as noted. Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—3500 lb and over; [5]—1000 to 1999 lb.

Ores

Lake Superior Iron Ore
(1951 contract prices; 1952 prices not established)

Gross ton, 51½% (natural), lower lake ports.

After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in applicable lake vessel rates, upper lake rail, freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

Eastern Local Ore
Cents per unit del., E. Pa.

Foundry and basic 56-62% concentrates contract	17.00

Foreign Ore
Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 65%:	
Spot	nom.
Long-term contract	$20.00-24.00
North African hematites (spot)	26.00-28.00
Brazilian iron ore, 68-69% (spot)—	30.00-31.00

Tungsten Ore
Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$65.00
Domestic scheelite mines	65.00

Manganese Ore

Manganese, 48% nearby, $1.18-1.22 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 85c-87c.

Chrome Ore

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$39.00-42.00
48% 3:1	44.00-45.00
48% no ratio	30.00-32.00

South African Transvaal

44% no ratio	$27.00-28.00
48% no ratio	34.00-35.00

Brazilian

44% 25:1 lump	nom.

Rhodesian

45% no ratio	$29.00
48% no ratio	31.50-32.00
48% 3:1 lump	50.00-51.00

Domestic—rail nearest seller

48% 3:1	$39.00

Molybdenum

Sulphide concentrates per lb, molybdenum content, mines	$1.00

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $75, Palmerton, Pa.; $75, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $185 per gross ton of alloy, c.l. packed, $197; gross ton lots, packed, $212; less gross ton lots, packed $229; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Ashtabula, O. Base price: $187, Johnstown, Pa.; $185, Sheridan, Pa.; $188, Etna, Pa.; $186, Anaconda, Mont.

Shipment from Pacific Coast warehouses by one seller, add $33 to above prices f.o.b. Los Angeles, Oakland, Portland, Oreg. Shipment from Chicago warehouse, ton lots $227; less gross ton lots, $244, f.o.b. Chicago. Add or subtract $2.30 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max, 0.07% C, 25.75c per lb of contained Mn, carload packed 26.5c, ton lots 27.6c, less ton 28.8c. Delivered. Deduct 0.5c for max, 0.15% C grade from above prices, 1c for max, 0.30% C, 1.5c for max 0.50% C, and 4.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max). Carload, lump, bulk 19.15c per lb of contained Mn, carload packed 19.9c, ton lot 21.0c, less ton 22.2c. Delivered. Spot, add 0.25c.

Manganese metal, 2" x D (Mn 96% min, Fe 2% max, Si 1% max, C 0.2% max): Carload, lump, bulk, 34c per lb of metal; packed, 34.75c; ton lot 36.25c; less ton lots 38.25c. Delivered. Spot, add 2c.

Manganese, Electrolytic: 40,000 lb or more, 28c; 2000 to 39,999 lb, 30c; 250 to 1999 lb, 32c. Premium for hydrogen-removed metal, 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65 - 68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si 9.90c per lb of alloy, carload packed, 10.65c, ton lots 11.55c, less ton 12.55c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, Add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $177 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%.) Contract, $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 56-60%, Si 8% max., C 0.4% max). Contract, ton lot, 2" x D, $4.90 per lb of contained Cb, less ton $4.95. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx, Ta 20% approx, and Cb and Ta 60% min, C 0.30% max) ton lots, 2" x D, $3.75 per lb of contained Cb plus Ta, deld.; less ton lots $3.80.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 45c per lb of alloy, ton lot 47c, less ton lot 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Contract, carload, packed, ½" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Deld. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18c per lb of alloy; ton lots 19c; less ton lots 20.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 15c per lb of alloy; ton lots 16.50c; less ton lots 17.75c, f.o.b., Niagara Falls; freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal. Fe) Lump, carload bulk 14.50c, packed 15.50c; ton lots, packed, 15.75c; less ton lots, packed, 16.25c per lb of alloy, delivered to destination within United States.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo f.o.b. Langeloth, $1.32 in all sizes except powdered which is $1.41; Washington, Pa., furnace, any quantity $1.32.

Technical Molybdic-Oxide: Per lb, contained Mo, f.o.b. Langeloth, Pa., $1.14, in cans; in bags, $1.13, f.o.b. Langeloth, Pa.; Washington. Pa., $1.13.

NOTE: Current prices on chromium, silicon, vanadium, boron and tungsten alloys appeared on page 163, June 9 issue; calcium zirconium and briquetted alloys, page 175, June 2. Refractories Prices also were published on page 175, June 2 issue.

CEILING PRICES, IRON AND STEEL SCRAP

Prices as set forth in Office of Price Stabilization ceiling price regulation No. 5, as amended Feb. 5, 1952.

STEELMAKING SCRAP COMPOSITE

June 12	$43.00
June 5	43.00
May 1952	43.00
June, 1951	44.00
June, 1947	32.48

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

Basing point ceiling prices per gross ton from which maximum shipping prices are computed on scrap of dealer and industrial origin; and from which ceiling on-line and ceiling delivered prices are computed on scrap of railroad origin..

Basing Point	No. 1 Bundles Dealer, Industrial	No. 1 Heavy Melt Railroad
Alabama City, Ala.	$39.00	$41.00
Ashland, Ky.	42.00	44.00
Atlanta, Ga.	39.00	41.00
Bethlehem, Pa.	42.00	44.00
Birmingham, Ala.	39.00	41.00
Brackenridge, Pa.	44.00	46.00
Buffalo, N. Y.	43.00	45.00
Butler, Pa.	44.00	46.00
Canton, O.	44.00	46.00
Chicago, Ill.	42.50	44.50
Cincinnati, O.	43.00	45.00
Claymont, Del.	42.50	44.50
Cleveland, O.	43.00	45.00
Coatesville, Pa.	42.50	44.50
Conshohocken, Pa.	42.50	44.50
Detroit, Mich.	41.15	43.15
Duluth, Minn.	40.00	42.00
Harrisburg, Pa.	42.50	44.50
Houston, Tex.	37.00	39.00
Johnstown, Pa.	44.00	46.00
Kansas City, Mo.	39.50	41.50
Kokomo, Ind.	42.00	44.00
Los Angeles	35.00	37.00
Middletown, O.	43.00	45.00
Midland, Pa.	44.00	46.00
Minnequa, Colo.	38.00	40.00
Monessen, Pa.	44.00	46.00
Phoenixville, Pa.	42.50	44.50
Pittsburg, Calif.	35.00	37.00
Pittsburgh, Pa.	44.00	46.00
Portland, Oreg.	35.00	37.00
Portsmouth, O.	42.00	44.00
St. Louis, Mo.	41.00	43.00
San Francisco	35.00	37.00
Seattle, Wash.	35.00	37.00
Sharon, Pa.	44.00	46.00
Sparrows Pt., Md.	42.00	44.00
Steubenville, O.	44.00	46.00
Warren, O.	44.00	46.00
Weirton, W. Va.	44.00	46.00
Youngstown, O.	44.00	46.00

Differentials from Base

Differentials per gross ton for other grades of dealer and industrial scrap:

O-H and Blast Furnace Grades

2. No. 1 Busheling	Base
3. No. 1 Heavy Melting	—$1.00
4. No. 2 Heavy Melting	— 1.00
5. No. 2 Bundles	— 1.00
6. Machine Shop Turnings	— 10.00
7. Mixed Borings and Short Turnings	— 6.00
8. Shoveling Turnings	— 6.00
9. No. 2 Busheling	— 4.00
10. Cast Iron Borings	— 6.00

Elec. Furnace and Fdry. Grades

11. Billet, Bloom & Forge Crops	+ 7.50
12. Bar Crops & Plate	+ 5.00
13. Cast Steel	+ 5.00
14. Punchings & Plate Scrap	+ 2.50
15. Electric Furnace Bundles	+ 2.00
Cut Structurals & Plate:	
16. 3 feet and under	+ 3.00
17. 2 feet and under	+ 5.00
18. 1 foot and under	+ 6.00
19. Briquetted Cast Iron Borings	Base
Foundry, Steel:	
20. 2 feet and under	Base
21. 1 foot and under	+ 2.00
22. Springs and Crankshafts	+ 1.00
23. Alloy Free Turnings	— 3.00
24. Heavy Turnings	— 1.00
25. Briquetted Turnings	Base
26. No. 1 Chemical Borings	— 3.00
27. No. 2 Chemical Borings	— 4.00
28. Wrought Iron	+10.00
29. Shafting	+10.00
31. Old Tin & Terne Plated Bundles	—10.00

Unprepared Grades

When compressed constitutes:

32. No. 1 Bundles	— 6.00
33. No. 2 Bundles	— 9.00
34. Other than material suitable for hydraulic compression	— 8.00

Restrictions on Use

(1) Prices for Grades 11 and 23 may be charged only when shipped to a consumer directly from an industrial producer; otherwise ceiling prices shall not exceed prices established for Grades 12 and 8, respectively.

(2) Prices established for Grades 26 and 27 may be charged only when sold for use for chemical or annealing purposes, and in the case of Grade 27, for briquetting and direct charge into an electric furnace; otherwise ceiling prices shall not exceed price established for Grade 10.

(3) Prices established for Grade 28 may be charged only when sold to a producer of wrought iron; otherwise ceiling price shall not exceed ceiling price for corresponding grade of basic open-hearth.

(4) Premiums for Grades 11-18, 20 and 21 may be charged only when sold for use in electric and acid open-hearth furnaces or foundries; or in basic O-H or blast furnace under NPA allocation or OPS authorization.

(5) Prices for Grade 29 may be charged only when sold for forging or rerolling purpose.

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap:

2. No. 2 Heavy Melting Steel	—$2.00
3. No. 2 Steel Wheel	Base
4. Hollow Bored Axles and loco. axles with keyways between the wheelseats.	Base
5. No. 1 Busheling	— 3.50
6. No. 1 Turnings	— 3.00
7. No. 2 Turnings, Drillings & Borings	—12.00
8. No. 2 Cast Steel and uncut wheelcenters	— 6.00
9. Uncut Frogs, Switches.	Base
10. Flues, Tubes & Pipes	— 8.00
11. Structural, Wrought Iron and/or/steel, uncut	— 6.00
12. Destroyed Steel Cars	— 8.00
13. No. 1 Sheet Scrap	— 9.50
14. Scrap Rails, Random Lengths	+ 2.00
15. Rerolling Rails	+ 7.00
Cut Rails:	
16. 3 feet and under	+ 5.00
17. 2 feet and under	+ 6.00
18. 18 inches and under.	+ 8.00
19. Cast Steel, No. 1	+ 3.00
20. Uncut Tires	+ 2.00
21. Cut Tires	+ 5.00
Bolsters & Side Frames:	
22. Uncut	Base
23. Cut	+ 3.00
24. Angles, Splice Bars & Tie Plates	+ 5.00
25. Solid Steel Axles	+12.00
26. Steel Wheels, No. 3 oversize	Base
27. Steel Wheels, No. 3	+ 5.00
28. Spring Steel	+ 5.00
29. Couplers & Knuckles	+ 5.00
30. Wrought Iron	+ 8.00
31. Fireboxes	— 8.00
32. Boilers	— 6.00
33. No. 2 Sheet Scrap	—13.00
34. Carsides, Doors, Car Ends, cut apart	— 6.00
35. Unassorted Iron & Steel	— 6.00
36. Unprepared scrap, not suitable for hydraulic compression	— 8.00

Restrictions on Use

(1) Price established for Grade 15 may be charged only when purchased and sold for rerolling uses; otherwise, ceiling shall not exceed that for Grade 14.

(2) Price established for Grade 30 may be charged only when sold to a producer of wrought iron; otherwise, ceiling shall not exceed that for No. 1 heavy melting steel.

(3) Price for Grade 25 may be charged only when sold for rerolling and forging purposes; otherwise, ceiling shall not exceed that for base grade (No. 1).

Preparation Charges

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of dealer or industrial origin authorized by OPS are:

(1) For preparing into Grades No. 3, No. 4 or No. 2, $8.
(2) For hydraulically compressing Grade No. 1, $6 per ton; Grade No. 5, $8.
(3) For crushing Grade No. 6, $3. For preparing into:
(4) Grade No. 25, $6.
(5) Grade No. 19, $6.
(6) Grades No. 12, No. 13, No. 14, No. 16, or No. 20, $10.
(7) Grade No. 17 or No. 21, $11.
(8) Grade No. 18, $12.
(9) For hydraulically compressing Grade No. 15, $8.
(10) For preparing into Grade No. 28, $10.

Ceiling fees per gross tons which may be charged for intransit preparation of any grade of steel scrap of railroad origin shall be:

(1) For preparing into Grade No. 1 and Grade No. 2, $8.
(2) For hydraulically compressing Grade No. 13, $6.

For preparing into:

(3) Grade No. 16, $4.
(4) Grade No. 17, $5.
(5) Grade No. 18, $7.
(6) Grade No. 21, $4.
(7) Grade No. 23, $4.

Ceiling fees per gross ton which may be charged for intransit preparation of cast iron are limited to:

(1) For preparing Grade No. 8 into grade No. 7, $9.
(2) For preparing Grade No. 3 into Grade No. 11, $7.
(3) For preparing Grade No. 3 into Grade No. 1, $4.

Premium for Alloy Content

No premium may be charged for alloy content except: $1.25 per ton for each 0.25% of nickel where scrap contains not less than 1% and not over 5.25% nickel; $2 per ton for scrap containing not less than 0.15 per cent molybdenum and $3 for scrap containing not less than 0.65% molybdenum; for scrap containing not less than 10% manganese, $4 for scrap in sizes larger than 12 x 24 x 8 in., and $14 for scrap cut in that size or smaller (applicable only if scrap is sold for electric furnace uses or on NPA allocation); $1 for scrap conforming to SAE 52100.

CAST IRON SCRAP

Ceiling price per gross ton for following grades shall be f.o.b. shipping point:

Cast Iron:

1. No. 1 (Cupola)	$49.00
2. No. 2 (Charging Box)	47.00
3. No. 3 (Hvy. Breakable)	45.00
4. No. 4 (Burnt Cast)	41.00
5. Cast Iron Brake Shoes	41.00
6. Stove Plate	46.00
7. Clean Auto Cast	52.00
8. Unstripped Motor Blocks	43.00
9. Wheels, No. 1	47.00
10. Malleable	55.00
11. Drop Broken Machinery	52.00

Restrictions on Use

(1) Ceiling shipping point price which a basic open-hearth consumer may pay for No. 1 cast iron, clean auto cast, malleable or drop broken machinery cast shall be ceiling price for No. 2 charging box cast.

OPEN MARKET PRICES

Birmingham
(Delivered)

No. 1 cupola cast	$42.00-43.00
Stove plate	38.00-39.00
Charging box cast	39.00-40.00
Heavy breakable	36.00-37.00
Drop broken machinery	42.00-43.00
Unstripped motor blocks	35.00-36.00

Boston
(F.o.b. shipping point)

No. 1 cupola cast	34.00
Heavy breakable	32.00
Stove plate	32.00
Unstripped motor blocks	30.00

Buffalo
(Delivered)

No. 1 cupola cast	41.00-43.00
Machine shop turnings	28.00-29.00
Short shoveling turnings	32.00-33.00
Cast iron borings	31.00
Mixed borings, turnings	32.00-33.00

Chicago
(Delivered)

Machine shop turnings.	30.50
Mixed borings, turnings	34.50
Shoveling turnings	34.50
Cast iron borings	34.50
No. 1 cupola cast	43.00-47.00
Charging box cast	39.00-41.00
Heavy breakable	36.00-38.00
Burnt cast	36.00-38.00
Cast iron brake shoes	40.00-41.00
Stove plate	36.00-41.00
Clean auto cast	43.00-45.00
Unstripped motor blocks	33.00-35.00
Malleable	48.00-50.00
Drop broken machinery	45.00-50.00

Cleveland
(Delivered)

No. 1 cupola cast	44.00

Detroit
(Brokers' buying prices; f.o.b. shipping point)

Machine shop turnings.	24.00-25.00
No. 1 cupola cast	43.00-44.00
Heavy breakable	39.00
Clean auto cast	46.00-47.00
Unstripped motor blocks	36.00-37.00
Drop broken machinery.	46.00-47.00
Stove plate	42.00-43.00
Charging box cast	43.00

New York
(Brokers' buying prices; delivered consumers' plants)

Cupola cast	38.00
Unstripped motor blocks	34.00

Philadelphia
(Delivered)

No. 1 cupola cast	38.00-39.00
Unstripped motor blocks	35.00
Heavy breakable	42.00
Machinery cast	43.00-44.00

Pittsburgh
(Delivered)

No. 1 cupola cast	46.00
Heavy breakable	45.00
Charging box cast	47.00

San Francisco
(Delivered)

No. 2 bundles	30.00
No. 1 cupola cast	41.00

Seattle
(F.o.b. shipping point)

No. 2 bundles	29.00
No. 1 cupola cast	44.00
Heavy breakable	40.00

St. Louis
(Delivered)

No. 1 cupola	41.00
Stove plate	39.00
Unstripped motor blocks	35.00

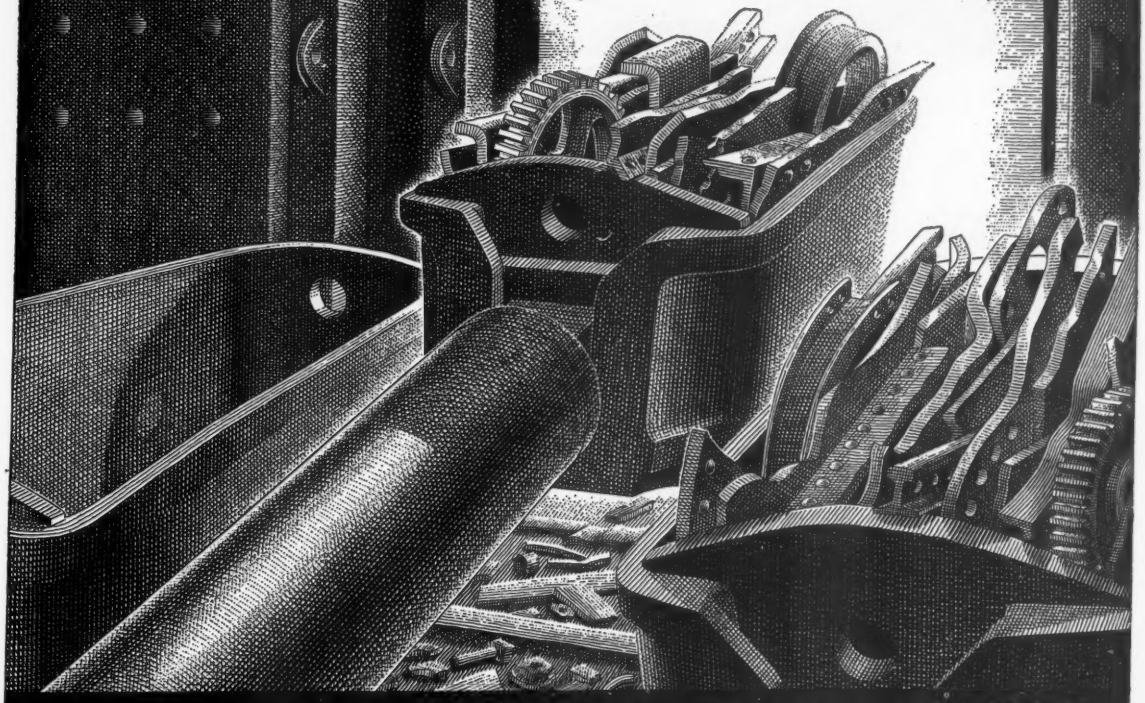
HAMILTON, ONT.
(Delivered Prices)

Heavy Melt	$35.00
No. 1 Bundles	35.00
No. 2 Bundles	35.00
Mechanical Bundles	31.50
Mixed Steel Scrap	31.00
Mixed Borings, Turnings	32.00
Rails, Remelting	35.00
Rails, Rerolling	38.00
Busheling	29.50
Bushelings new fractory:	
Prep'd	33.00
Unprep'd	31.00
Short Steel Turnings	32.00
Cast Iron Grades*	
No. 1 Machinery Cast	50.00

* F.O.B. shipping point.

SCRAP *at your Service!*

The facilities and experienced personnel in each of our offices, stand ready to supply your every scrap requirement whenever and wherever needed.



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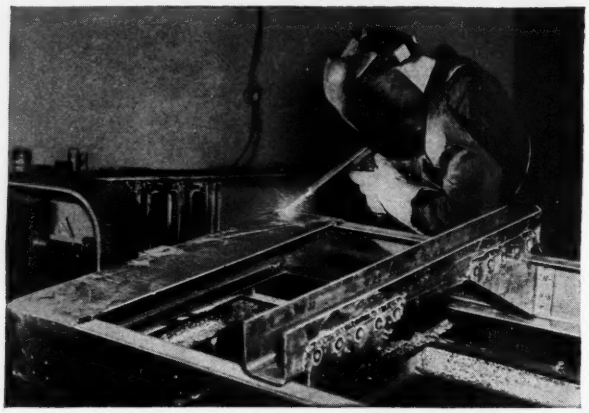
LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Aircomatic welding frame of Marotta Trailer. Each trailer required about 260 lineal inches of weld. Welding wire fed into the joints at 225 inches per minute permitted a new trailer to come off the line every half hour . . . eight times faster than possible with older methods.

Trailers manufactured by the Marotta Engineering Co., Boonton, N. J., for use on U. S. Air Force bases. They are used singly or in trains to move supplies rapidly for plane loadings.



THERE'S A LONG, LONG TRAILER WINDING...

. . . a result of High-Speed AIRCOMATIC® Welding

Trailer trains to move supplies and plane loads rapidly are part of the efficiency found on U. S. Air Forces bases the world over.

Building the required trailers was the job of the Marotta Engineering Co. of Boonton, N. J. For lightweight strength, aluminum was used . . . for rugged dependability and lasting service, arc welded design was chosen.

To match the high quality of the 61S-T6 aluminum . . . and to meet the high production schedules . . . trailers were fabricated with Air Reduction's inert-gas-shielded metal-arc welding process — Aircomatic.

Aluminum — and other hard-to-weld metals, stainless, bronze, monel, and other nickel alloys — are easy-welding when Aircomatic is on the job.

This economical, fast-welding technique makes possible fewer passes on heavier metal . . . faster, heavy deposits for overlay work or build-up. Electrode changes and slag removal are eliminated, permitting almost 100% arc time at high operating speeds.

Facts and figures you need to know about Aircomatic equipment are available in your copy of Catalog 17: "Aircomatic Process" . . . call your nearest Airco office, or write Air Reduction Sales Company, Advertising Department, 60 East 42nd Street, New York 17, N. Y.

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The Metal Market

Steel strike is influencing users of other metals to be cautious in their commitments. Industry hopes to start fall production season with clearer atmosphere

WET BLANKET of the steel impasse is having its effect on other metals too.

Part of the current reduction in buying tempo is in anticipation of the slowdown of industry during the vacation season. Much comes from a "wait and see" attitude towards possible strikes in aluminum and brass industries. Many companies are holding off until labor turbulence has run its gamut. They want to study finished product prices before freezing summer work schedules. Buyers of price-weak metals are awaiting further price concessions.

New Leaf—Summer doldrums and resolving of labor problems should help relieve many supply pressures. Industry hopes to commence the fall production season with fewer clouds over supply, more realism in price, less government control over use, and stronger demand for civilian products.

Even now many metals are in good supply and improving daily. Copper is still a question mark, but the picture isn't as bleak as commonly painted. Brass and bronze products have improved steadily, and ingot deliveries are still easy. Scrap is now moving in good volume. Restrictions on brass mill warehouse shipments are likely to be suspended soon, equilibrium is near and mills start vacations in two weeks.

Balance Sheet — Deliveries have quickened on nearly all aluminum products. Lead, zinc, antimony, cadmium are available any time, in about any form. Prices are soft, too. Tin, mercury and silver have eased, the latter two weakening in price. Nickel is still constricted, but will ease gradually as new production reaches the market.

Wire Mills Accept NPA Plan

Brass and copper wire mills have swung behind NPA's copper plan, probably because they consider it the lesser of many evils and because quick action is needed. After July 1, says NPA, mills will get 60 per cent of their allocation in domestic copper—80,000 tons—and a carte blanche to buy the rest—53,000 tons—in foreign copper at prevailing prices. Eighty per cent of the cost over the 24½ cent domestic ceiling can be passed on to consumers.

OPS intends to regard the delivered price of foreign copper at 36.50 cents a pound. At that price, net increase in copper products price would average a little over 3.8 cents a pound. Brass products will increase about 2.7 cents a pound. Copper is expected to move slowly at 36.50 cents and quotations below that level are likely. Because OPS will repeg the foreign price only every two months, buyers of foreign copper in all probability will be able to pass on more than 80 per cent of the increased price. Custom smelters who buy foreign ores and concentrates have dropped out of the market until OPS clarifies the price at which they can sell. Under present regulations, the 24½ cent domestic ceiling would apply to them.

Relief for Costume Jewelers

Costume jewelers now can use brass in working parts of their product. Substitution is possible in decorative parts of costume jewelry but not in findings—pins, safety catches, etc. NPA will allow jewelry firms to assign part of their brass quotas to findings manufacturers turning out the working parts. Employment in the industry—concentrated in Attleboro, Mass.,-Providence, R. I., areas —is running about 20 per cent under 1950. Most costume jewelers are small firms; of about 1800 shops in the industry, 75 per cent employ less than 20 workers.

Aluminum Shipments Improve

Aluminum shipments show progressive loosening with each month as new capacity is added. Output through April ran 13 per cent ahead of the first four months of last year and 22 per cent ahead of the same period during 1943, peak year of World War II. Latest figures from the Aluminum Association, for April, show shipments of sheet and plate, foil, and foundry products all increased substantially over the month.

Prime Western Zinc Piles Up

Prime western zinc is piling up sharply with the steel strike and no real improvement in demand for higher grades resulted from the price cuts. Summer should see further increases in stock; May production and shipment figures give a small sample of what to expect. Going into June, zinc stocks were highest since 1949, unfilled orders lowest since 1945. Except for last September, shipments were lowest of any month since 1950. Shipments on government account were second-highest in a year and a half though.

Three Lions

Tin Ore Feels the Heat

Natives at Chjilla, Bolivia, work the ovens which reduce to concentrates the high-grade tin ore from the Potosi mines. The ore is roasted to rid it of sulphur. The International Mining Co., a Grace enterprise, is in control of these particular mines

Nonferrous Briefs

A tailored pricing regulation is in the works for the over-all forgings industry, including aluminum, brass, drop, open die press and hammer forgings . . . Cadmium markets remain dull despite deepest price cuts of any metal to date; problem is to attract platers and other former customers cut off by use restrictions . . . Tin use should spurt following resumption of steelmaking, stocks averaged about four weeks in the mills at strike start . . . Removed from NPA's list of scarce materials were antimony, bismuth, cadmium, lead, zinc and zircon . . . The aluminum forgings industry is operating at only 50 to 60 per cent of capacity.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 24.50c, Conn. Valley Lake 24.62½c, delivered.

Brass Ingots: 85-5-5-5 (No. 115) 27.25c, 88-10-2 (No. 215) 40.00c; 80-10-10 (No. 305) 33.00c; No. 1 yellow (No. 405) 23.25c.

Zinc: Prime western 16.00c; brass special 16.25c; intermediate 16.50c, East St. Louis; high grade 17.35c, delivered.

Lead: Common 14.80c; chemical 14.90c; corroding 14.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c, pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb c.l. orders.

Secondary Aluminum: Piston alloys 20.50c; No. 12 foundry alloy (No. 2 grade) 19.50c; steel deoxidizing grades, notch bars, granulated or shot; Grade 1, 18.50c; grade 2, 18.60c; grade 3, 18.40c; grade 4, 18.20c.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt 121.50c.

Antimony: American 99-99.8% and over but not meeting specifications below 39.00c; 99.8% and over (arsenic 0.05% max., other impurities 0.1% max.) 39.50c; f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 56.50c; 25-lb pigs, 59.15c; "XX" nickel shot, 60.15c; "F" nickel shot or ingots, for addition to cast iron, 56.50c. Prices include import duty.

Mercury: Open market, spot, New York, $195-$200 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b. Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.25 del.; special or patented shapes $2.40.

Cobalt: 97.99%, $2.40 per lb for 500 lb (kegs); $2.42 per lb for 100 lb (case); $2.47 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York 82.75c per oz.

Platinum: $90-$93 per ounce from refineries.

Palladium: $24 per troy ounce.

Iridium: $200 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Ceiling prices, cents per pound, f.o.b. mill, effective Aug. 23, 1951)

Sheet: Copper 41.68; yellow brass 38.28; commercial bronze, 95% 41.61; 90% 41.13; red brass, 85% 40.14; 80% 39.67; best quality, 39.15; nickel silver, 18%, 53.14; phosphor-bronze grade A, 5%, 61.07.

Rod: Copper, hot-rolled 37.53, cold-drawn 38.78; yellow brass free cutting, 32.63; commercial bronze 95%, 41.30; 90% 40.82; red brass 85%, 39.83; 80%, 39.36.

Seamless Tubing: Copper 41.72; yellow brass 41.29; commercial bronze, 90%, 43.79; red brass, 85%, 43.05.

Wire: Yellow brass 38.57; commercial bronze, 95%, 41.90; 90%, 41.42; red brass, 85%, 40.43; 80%, 39.96; best quality brass, 39.44.

(Base prices, effective Dec. 26, 1951)

Copper Wire: Bare, soft, f.o.b. eastern mills, 100,000 lb lots, 28.545; 30,000 lb lots, 28.67; l.c.l., 29.17. Weatherproof, 100,000 lb, 30.35; 30,000 lb, 30.60; l.c.l., 31.10. Magnet wire del., 15,000 lb or more, 34.50; l.c.l., 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders)

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range Inches	Widths or Diameters, In., Inc.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Dia. (in.) or distance across flats	—Round— R317-T4 17S-T4	R-317-T4	—Hexagonal— 17S-T4
0.125	52.0	....	....
0.156-0.0188	44.0	....	....
0.219-0.313	41.5	....	....
0.375	40.0	46.0	48.0
0.406	40.0	....	....
0.438	40.0	46.0	48.0
0.469	40.0	....	....
0.500	40.0	46.0	48.0
0.531	40.0	....	....
0.563	40.0	....	45.0
0.594	40.0	....	....
0.625	40.0	43.5	45.0
0.688	40.0	....	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	....	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	....	....
1.625	36.5	....	39.5
1.688-2.000	36.5	....	....

LEAD

(Prices to jobbers f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $20.00 per cwt; add 50c cwt 10 sq ft to 140 sq ft. Pipe: Full coils $20.00 per cwt. Traps and bends: List prices plus 50%.

ZINC

Sheets 23.00c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 21.50c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 22.00-23.00c; over 12-in., 22.00-23.00c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 77.00c. Strip, cold-rolled, 83.00c. Rods and shapes, 73.00c. Plates, 75.00c. Seamless tubes, 106.00c.

MONEL

(Base prices f.o.b. mill)

Sheets, cold-rolled 60.50c. Strip, cold-rolled 63.50c. Rods and shapes, 58.50c. Plates, 59.50c. Seamless tubes, 93.50c. Shot and blocks, 53.50c.

MAGNESIUM

Extruded Rounds 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

DAILY PRICE RECORD

1952	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
June 5-12	24.50	14.80	16.00	121.50	19.00	39.00	56.50	82.75
June 2-4	24.50	14.80	17.50	121.50	19.00	39.00	56.50	82.75
May 28-31	24.50	14.80	19.50	121.50	19.00	39.00	56.50	82.75
May 20-27	24.50	14.80	19.50	121.50	19.00	39.00	56.50	84.00
May 16-19	24.50	14.80	19.50	121.50	19.00	44.00	56.50	84.00
May 15	24.50	14.80	19.50	121.50	19.00	44.00	56.50	85.00
May 13-14	24.50	14.80	19.50	121.50	19.00	44.00	56.50	86.00
May 12	24.50	14.80	19.50	121.50	19.00	44.00	56.50	87.00
May 6-10	24.50	16.80	19.50	121.50	19.00	44.00	56.50	87.00
May 2-5	24.50	16.80	19.50	121.50	19.00	44.00	56.50	88.00
May Avg.	24.50	15.519	19.50	121.50	19.00	42.077	56.50	85.356
Apr. Avg.	24.50	18.723	19.50	121.50	19.00	49.077	56.50	88.00
Mar. Avg.	24.50	18.80	19.50	121.50	19.00	50.00	56.50	88.00
Feb. Avg.	24.50	18.80	19.50	121.50	19.00	50.00	56.50	88.00
Jan. Avg.	24.50	18.80	19.50	109.404	19.00	50.00	56.50	88.00

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked. Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials

Chromic Acid: 99.9% flakes, f.o.b. Philadelphia, carloads, 28.00c; 5 tons and over 28.50c; 1 to 5 tons, 29.00c; less than 1 ton 29.50c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat, rolled, 38.34c; oval 37.84c.

Nickel Anodes: Rolled oval, carbonized, carloads, 74.50c; 10,000 to 30,000 lb. 75.50c; 3000 to 10,000 lb. 76.50c; 500 to 3000 lb 77.50c; 100 to 500 lb, 79.50c; under 100 lb, 82.50c; f.o.b. Cleveland.

Nickel Chloride: 36.50c in 100 lb bags; 34.50c in lots of 400 lb through 10,000 lb; 34.00c over 10,000 lb, f.o.b. Cleveland, freight allowed on 400 lb or more.

Sodium Stannate: 25 lb cans only, less than 100 lb to consumers 86.7c; 100 or 350 lb drums only, 100 to 600 lb 71.60c; 700 to 1900 lb, 69c; 2000 to 9900 lb, 67.3c. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Tin Anodes: Bar, 1000 lb and over, $1.375; 500 to 999 lb, $1.38; 200 to 499 lb, $1.385; less than 200 lb, $1.40. Freight allowed east of Mississippi and north of Ohio and Potomac.

Zinc Cyanide: 100 lb drums, less than 10 drums 54.30c, 10 or more drums, 52.30c, f.o.b. Niagara Falls, N. Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb $1.11; more than 2000 lb, $1.09. Freight allowed east of Mississippi and north of Ohio and Potomac rivers.

Stannous Chloride (Anhydrous): In 400 lb bbl, 98.5c; 100 lb kegs 99.5c. Freight allowed.

Scrap Metals

Brass Mill Allowances

Ceiling prices in cents per pound for less than 20,000 lb, f.o.b. shipping point, effective June 26, 1951.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	21.50	21.50	20.75
Yellow Brass	19.125	18.875	17.875
Commercial Bronze			
95%	20.50	20.25	19.75
90%	20.50	20.25	19.75
Red Brass			
85%	20.25	20.00	19.375
80%	20.125	19.875	19.375
Muntz metal	18.125	17.875	17.375
Nickel silver, 10%	21.50	21.25	10.75
Phos. Bronze, 5%	25.25	25.00	24.00

Copper Scrap Ceiling Prices

(Base prices, cents per pound, less than 40,000 lb f.o.b. point of shipment)

Group 1: No. 1 copper 19.25; No. 2 copper wire and mixed heavy 17.75; light copper 16.50; No. 1 borings 19.25; No. 2 borings 17.75; refinery brass, 17.00 per lb of dry Cu content for 50 to 60 per cent material and 17.25 per lb for over 60 per cent material.

Group II: No. 1 soft red brass solids 18.50; No. 1 composition borings 19.25 per lb of Cu content plus 63 cents per lb of tin content; mixed brass borings 19.25 per pound of Cu content plus 60 cents per lb of tin content; unlined red car boxes 18.25; lined red car boxes 17.25; cocks and faucets 16.00; mixed brass screens 16.00; zincy bronze solids and borings 16.25.

Aluminum Scrap Ceiling Prices

(Cents per pound, f.o.b. point of shipment, less than 5000 lb)

Segregated plant scrap: 2s solids, copper free, 10.50; high grade borings and turnings, 8.50; No. 12 piston borings and turnings, 7.50; Mixed plant scrap: Copper-free solids, 10.00; dural type, 9.00. Obsolete scrap: Pure old cable, 10.00; sheet and sheet utensils, 7.25; old castings and forgings, 7.75; clean pistons, free of struts, 7.75; pistons with struts, 5.75.

DEALERS' BUYING PRICES

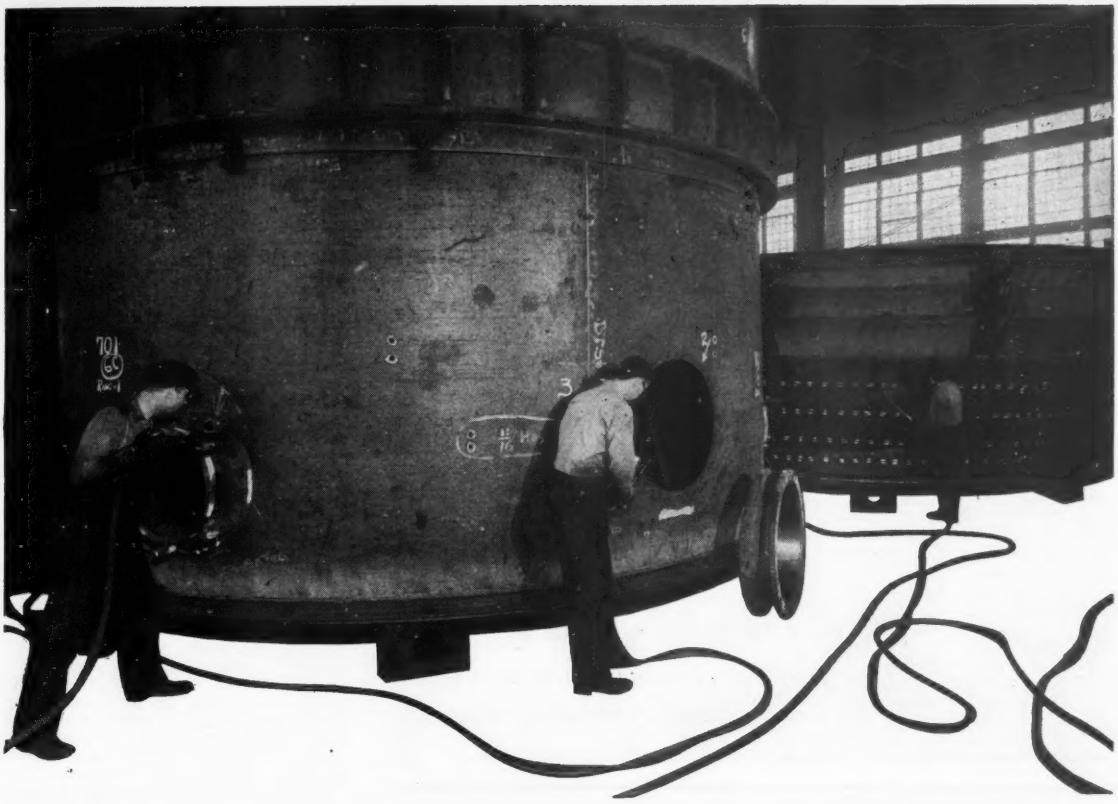
(Cents per pound, New York, in ton lots)

Lead: Heavy 11.00-11.25; battery plates 6.50-6.75; linotype and stereotype 12.50-13.00; electrotype 11.00-11.50; mixed babbitt 14.50-14.75.

SMELTERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Zinc: Old zinc, 8.75; new die cast scrap, 8.50; old die cast scrap, 8.50.



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A combination of tough Republic Hose and fast Republic service keeps assembly lines moving at the William B. Pollock Company.

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In the field, where the big furnaces are finally assembled, there's literally miles of hose used. A riveter atop an open hearth stack can be as high as 520 ft. up, and another 500 or more feet away from an air line source.

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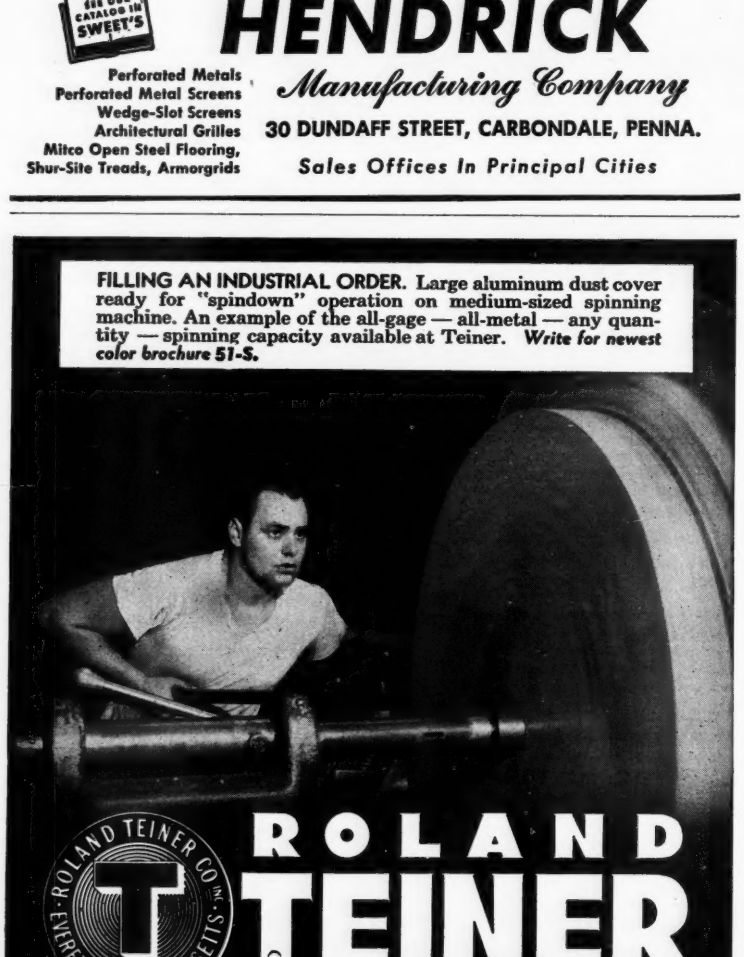

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Stainless Steel . . .

Stainless Steel Prices, Page 201

Pittsburgh — Consumers' stainless stocks are at satisfactory levels, so there has been no flurry of scare ordering. Carryover into the fourth quarter is currently estimated at about two weeks.

A new producer of stainless specialty wire products, Pittsburgh Rolling Mill Co., initiated operations at its Washington, Pa., plant a week ago. The company's main office is located in Pittsburgh. President C. R. Anthony says the company's products will include: Stainless flat-rolled wire, cotter pin wire, hexagon and angle wire, uncoated welding rods and narrow strip. Production facilities include a 6 and a 10-inch rolling mill, annealing furnace and two Morgan counter draw benches. Output is expected to exceed 5000 pounds per 8-hour day.

Sheets, Strip . . .

Sheet and Strip Prices, Page 197 & 198

Cleveland—Sheet production lost as result of the strike will serve to tighten the market noticeably in the last half of the year. Producers generally were booked full for third quarter on major grades when the walkout started and now indications are fourth quarter schedules will be pretty well filled. In fact, should the strike last a month, some producers may find it necessary to blank out tonnage both in third and fourth quarters to care for carryover.

Boston—Tonnage lost in production shutdowns is already sufficient to shake down inventories in sheets despite lower consumption by many users next month. Consumers who cut back to estimated requirements are going to be short on steel before replacements again move into plants in volume. Fourth quarter will be a two-month allotment period for numerous consumers. At current lower rate of consumption, notably by appliance and textile mill equipment builders, industry entered the last strike with 30 to 45 days supply. Silicon cold-rolled in coils has tightened materially. Cold strip production is holding up with converters, but at expense of stocks of hot-rolled.

New York—While various consuming plants will soon be going down for mass vacations, indications are that the major grades of sheets and strip will be in reasonably tight supply throughout the third quarter, especially in view of recent work stoppages at the steel mills.

Philadelphia—Sheet consumers are not much disturbed by the steel strike. Manufacturers of household appliances, in general, have sufficient inventories on hand to last them a month or longer.

Pittsburgh—Capacity for the third quarter is fully committed but most mills aren't booking any fourth-quarter tonnage. Effect of the strike is to tighten any loose spots that might otherwise have appeared in the third quarter. No estimates of the tonnage loss are being hazarded by producers, since the total will depend on the speed with which mills can be put back into full operation.

Los Angeles—Consumers generally are well-stocked with steel and are

able to withstand the effects of the steel strike for 30 days.

Structural Shapes . . .

Structural Shape Prices, Page 197

Boston—District fabricating shops lack balance in inventory and some work has slowed down. Premium prices are being paid for the limited tonnage available for prompt shipment, imported structurals included.

New York—Apart from 5585 tons for East Bronx hospital, structural awards are light. However, various bridge jobs are active and considerable other public work is in prospect for bidding during the next several months.

Philadelphia — Structural inquiry is featured by 2200 tons for the second section of the Army ordnance plant at Birdsboro, Pa., being built under supervision of Valley Forge Associates for operation by Birdsboro Foundry & Machine Co.

Pittsburgh — Supply and demand balance is deferred a little longer. Estimates now made are that this condition will not be reached until some time in the fourth quarter. Increasing volume of inquiries from southern and western states for bridge construction work is reaching mills.

Seattle—Bethlehem's local fabricating plant was idled by the workers' walkout. Other plants were unaffected. One large operator reports his inventory will carry current operations six weeks.

Steel Bars . . .

Bar Prices, Page 197

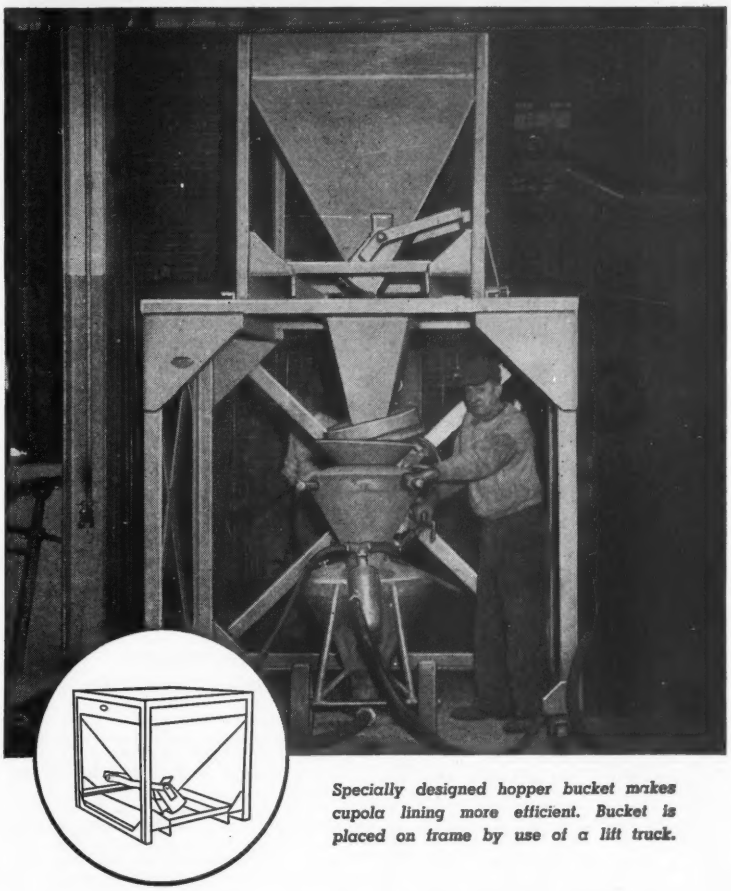
Chicago—Barmakers unaffected by the strike are just beginning to be queried for material under provisions of NPA's emergency program for top priority end-use. Tonnage for military trucks and tanks predominates. Number of such inquiries is expected to mount as the strike drags on. Government is active in seeking assistance of operating mills in the military fuze program. Several cold-finished bar producers continue to operate but their distribution is limited to emergency regulations.

Boston—Any possibility of an improvement in bar supply is eliminated by latest tonnage losses. Probably tightest of all steel products with an increasing volume required for military contracts, bars will be in short supply for an indefinite period. Setasides for defense third quarter automatically tighten mill schedules and forging requirements are mounting. Cold-finished bar converters are operating on inventories which vary considerably.

New York—While hot carbon bar producers have not opened their books for fourth quarter, there is no question but what, in the light of recent labor disturbances, no little tonnage now scheduled will be rolled in the final quarter of the year.

Philadelphia—Most hot carbon bar producers anticipate blanking out several weeks in fourth quarter to handle tonnage arrearages created by the labor disturbances. Some see a blank-out of at least a month.

Pittsburgh — Reduction in fourth-quarter allotments appears a virtual certainty since the strike increased



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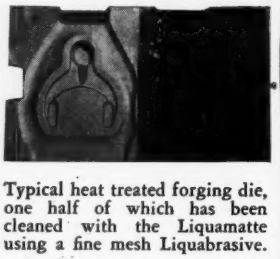

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American

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an already large carryover into the third quarter. There is insufficient time to pare allotments for the earlier period. Many consumers are already getting what they consider a bare minimum for their needs.

Cleveland — Further tightening in bar supply is indicated as result of the tonnage lost in the current steel strike. With the mills booked solidly through third quarter, expectations are the carryover from second quarter will force the blanking out of some third quarter production to take care of the arrearage. In turn, some tonnage in fourth quarter likely will be blanked out to care for the third-quarter carryover.

Tubular Goods . . .

Tubular Goods Prices, Page 201

Boston—Indications point to blanking out of at least one month on most tubular products in fourth quarter. Most producers are filled on direct shipments for pipe and mechanical tubing through third quarter, but these schedules will have to be revised. Distributors' stocks are fairly substantial and most have taken full allotments for August.

Plates . . .

Plate Prices, Page 197

New York — Regardless of how quickly full scale production is reached after the end of the steel strike, sheared plate supply will be tight throughout the third quarter, and probably well into the fourth quarter.

Delaware, Lackawanna & Western railroad has closed on 20 covered steel barges to the Staten Island yard of the Bethlehem Steel Co. The Erie railroad contemplates purchase of three diesel tug boats.

Boston—Third quarter plate production schedules will be subject to drastic revision and carryover into fourth quarter necessitating changes in scheduling.

Philadelphia—Lukens Steel Co., Coatesville, Pa., has a maintenance and repair program in prospect which will delay early resumption of full operations following the strike. Major projects are repairs to the company's 120-inch mill and the rebuilding of its 112-inch mill. The former will require two weeks and the latter five weeks.

Philadelphia — The two sheared plate mills operating in this district are busy, but there has been no appreciable swelling in demand.

Pittsburgh—An upswing in shipbuilding, both maritime and naval, attracts an increased tonnage of plates. Major items are the strengthening of tanker hulls and new construction programs for amphibious landing craft for the Navy. There will be at least a month's carryover into both the third and fourth quarters with the effect of shipbuilding's revival being felt in the latter period.

Seattle — Contracts for 12 steel barges and two lighters have been placed by the Navy with four firms in this area, totaling $948,783, and involving approximately 2000 tons of plates and shapes. Awards are: Gunderson Bros. Engineering Corp., Portland, Oreg., 120-foot refrigerator barge, $185,000; Albina Engine & Machine Works, Portland, 235-foot gasoline barge, $180,743; Portland Tug & Barge Co., two 110-foot lighters, $61,500; Reliable Welding Works, Olympia, Wash., ten 110-foot cargo barges, $459,960.

Wire . . .

Wire Prices, Page 199

Boston—Most non-integrated wire mills are producing from rods in stock. Inventories of high carbon semifinished are in relatively better supply than low carbon. Demand for wire has increased with operating producers, but little additional volume offered can be accepted in view of the fact rods available are needed to fill orders already booked. Consumers of heading wire in some cases have enough tonnage to carry through this month—or into vacation periods.

Cleveland—Should the steel strike be extended, wiremakers anticipate demand in the closing months of the year will be much better than had been indicated prior to the strike.

Tin Plate . . .

Tin Plate Prices, Page 198

Pittsburgh — Canmakers' inventories are in fair shape as a result of preparations made prior to the strike. Normally producers keep a fairly large tin plate stock in their plants and ship to canmakers' facilities as needed. In the last few months consumers accepted shipments in advance of use and stocked materials at plants. This planning makes their situation more comfortable now. Since the contract price was not advanced by tin plate producers the first of the year, consumers will benefit on shipments received to date at the old price.

Pig Iron . . .

Pig Iron Prices, Page 196

Cleveland—With foundry operations still lagging and the vacation period just ahead buyers are not showing too much concern over pig iron supplies. Some shops held comfortable inventories when the blast furnaces shut down. Larger foundries on defense work, however, will need tonnage soon and if the strike is prolonged will run into difficulties in a few weeks. Expectations are the strike-lost tonnage will noticeably firm up the merchant iron market over the summer.

Boston — Consumers of foundry and malleable iron are not concerned seriously over supply for next quarter. Combination of fair inventories and low melt, plus the fact the Everett furnace is producing, provides assurance requirements will be filled.

New York—District foundries generally have an adequate supply of pig iron on hand. In most cases, the gray iron foundries in particular, are operating at a reduced scale.

Philadelphia—Pig iron production is adversely affected by the strike, but so is consumption. This fact, combined with a further slide in operations at gray iron foundries, is resulting in an easing iron supply for the moment.

Pittsburgh—Stocks average from

two to four weeks and should be adequate to support activity at the current level until the start of the annual vacation period in the first two weeks of July.

Chicago — Foundry inventories of pig iron range from 15 to 30 days and with 2-weeks vacation closings just ahead the castings shops probably will be able to get along until iron production is resumed.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 197

Los Angeles—Fabricators are more concerned over effects of current strikes by AFL reinforcing ironworkers than the steel strike.

Seattle—Rolling mills of both Bethlehem Pacific Coast Steel Corp. and Northwest Steel Rolling Mills Inc. were closed June 3 by walkout of CIO workers, idling 1700 men in the local area. All operations were halted including delivery of finished products. The union consented to permit the shipping of a small quantity of steel urgently required by Bonneville Power Administration and Seattle's Skagit river power project.

Scrap . . .

Scrap Prices, Page 204

Pittsburgh—Mill stocks in the district range from 45 to 60 days, indicating that mills will be highly selective in accepting scrap once the strike ends. Dealer shipments are being held up but production scrap continues to flow toward the mills. Since this material is being laid down outside the plants, rehandling costs following resumption of operations will depend on the length of the stoppage. Some softening in the market is expected because of the relatively good inventory position of the mills. To date no distress scrap has appeared but this situation could come about rapidly. Absence of interest in blast furnace grades brings reports of offerings $3-$4 below ceiling prices, with no takers. Cast scrap grades haven't yet shown any strengthening and remain below ceilings.

Cleveland — With the steel mills closed down the scrap market is dull and featureless. Reports are circulating of weakness in turnings prices but offers of price concessions of $2 to $3 per ton under ceiling cannot be confirmed in the absence of buying. Electric furnace and foundry steel grades are firm at ceiling levels and tonnage is moving to those electric furnaces not affected by the strike. No definite sign of easing in the openhearth grades is seen but expectations are these grades will be under pressure when the mills resume production since consumer stocks range up to 60 days and material is piling up in dealers' yards during the strike period. The foundries are taking some cast material and demand is expected to pick up should a pig iron shortage develop. Cast prices continue weak.

Chicago—Scrap movement is at a virtual standstill here. Shipments of industrial and railroad material were completed by the June 6 deadline. Even the one district steelmaker still operating has withdrawn from the market. Dealers' yards are not greatly congested. There is specu-

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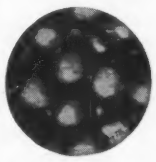

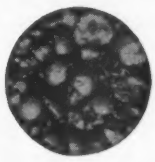

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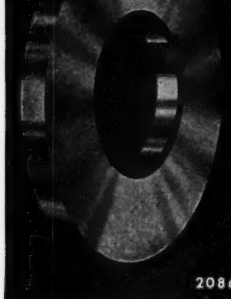

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25 TO 50 TON CAPACITY

DIESEL • GASOLINE • ELECTRIC • STEAM

THE OHIO LOCOMOTIVE CRANE CO.
BUCYRUS, OHIO

lation that on resumption of steel production a lower price level may be prevailing, at least on those items displaying pre-strike weakness, such as borings and turnings, and No. 2 dealer bundles.

Boston—Movement of scrap is near a standstill, both steel and cast grades. One steelworks that is operating is taking in No. 1 heavy melting, but it is also producing scrap by ship dismantling. Pressure on prices that brought cast grades down well below ceilings is expected to spread to steel scrap when the mills resume, notably No. 2.

Buffalo — Weakness and lower prices for blast furnace and cast grades feature the scrap market. Failure to settle the steel strike brought additional pressure on the market and unconfirmed reports an embargo may be placed on dealers' yards. Large accumulations as result of the strike, especially at yards of those dealers taking in material from industrial plants are reported. Turnings continue to flounder with prices off about $5 to $6.

Philadelphia—The local scrap market is in the doldrums. With most mills struck little steel scrap is moving and there is no improvement in demand for cast grades. Machinery cast is now around $43 to $44 delivered on the basis of small, scattered sales.

Los Angeles—With shipments of scrap suspended to all struck steel producers in the area, dealers' yard stocks are increasing.

Seattle — Mill buyers halted all scrap shipments. Cars on hand remained unloaded awaiting settlement of the strike. Foundries report ample supplies of cast iron and electric furnace scrap. Prices are unchanged.

Warehouse . . .

Warehouse Prices, Page 203

Cleveland—Some increase in consumer pressure for tonnage is reported by warehouses as result of the steel strike. The government ban on shipments to consumer durable goods manufacturers is scarecly felt by the distributors since tonnage lost from that direction is more than made up in requirements on military and essential goods account. Compliance Division of the National Production Authority is inspecting warehouse books to see that the government ban on shipments to consumer goods makers, including auto builders, is observed during the period of the strike. For the most part, the distributors are taking care of their regular customers with essential ratings. With warehouse stocks unbalanced, buyers have to do considerable shopping around to fill all their requirements. Generally, warehouse stocks are fairly comfortable but will quickly evaporate should the steel strike be prolonged, since currently outgoing shipments are not being replaced by receipts from the mills. To conserve supplies of aircraft quality alloy steel products, NPA established additional restrictions on warehouse sales of such items.

Boston—Distributors' demand holds at brisk pace on orders carrying ratings, part of this buying being diverted from mills. Most warehouses are trying to market premium cost steel products, including imported tonnage. At the same time, they are shying away from placing new orders at premium prices. Volume going to warehouses is high considering the freeze on orders for consumer and nonrated products.

New York—More mill buyers are turning to warehouses for defense requirements with individual orders averaging somewhat larger. Distributors are unable to handle all of this volume due to unbalanced stocks, although they are better off on cold-rolled and galvanized sheets.

Philadelphia — Warehouses have considerably more demand than they can handle for large bars, structurals of all sizes, and plates ¾-in. and over.

Pittsburgh—Warehouse inventories, unbalanced before the strike, are being further distorted, with the greatest demand naturally being for the items already in shortest supply. Heavy plates, bar size angles, small channels and large rounds are among the tightest items. With a couple of the larger warehouses also strikebound, those still operating are receiving inquiries from new sources.

Washington—Sales of aircraft quality alloy steel products by 28 warehouses handling such items are further restricted by NPA as a conservation move during the period of the steel strike. Telegraphed instructions to the warehouses stipulates that no consumer is permitted to accept delivery of any item of aircraft steel from a distributor if such customer has received a total of 5000 pounds from all sources during the month.

Chicago — Warehouse orders have picked up since the steel strike started. Those distributors not closed by the strike report orders above normal size. With receipts shut off, stocks shrinking and demand mounting, steps may be taken to limit quantity. Hot and cold-rolled sheets are in demand and fortunately are in reasonably good supply. Cold-finished bars are one of the few products available from producers, several of the latter not being strikebound.

Los Angeles—Of district distributors only U. S. Steel Supply Division of U.S. Steel Co. was strikebound. Other distributors report fabricators are not rushing to buy steel and distributors' sales are up only slightly from last month's level.

Seattle—Warehouses reported some rush buying incident to the steel strike, mostly from contractors who have emergency jobs under way. Suspension of steel production will seriously aggravate problems of wholesalers who have struggled for months with inadequate supplies.

Ferroalloys . . .

Ferroalloy Prices, Page 203

New York—Reflecting the easier situation in aluminum, the Vanadium Corp. of America has reduced prices on alsifer ¾ cents, retroactive to May 15. Under the new schedule alsifer is now quoted as follows: Contract, basis f.o.b., Niagara Falls, N. Y., lump, carload, bulk, 9.15c per pound of alloy; ton lots packed,

A-1029

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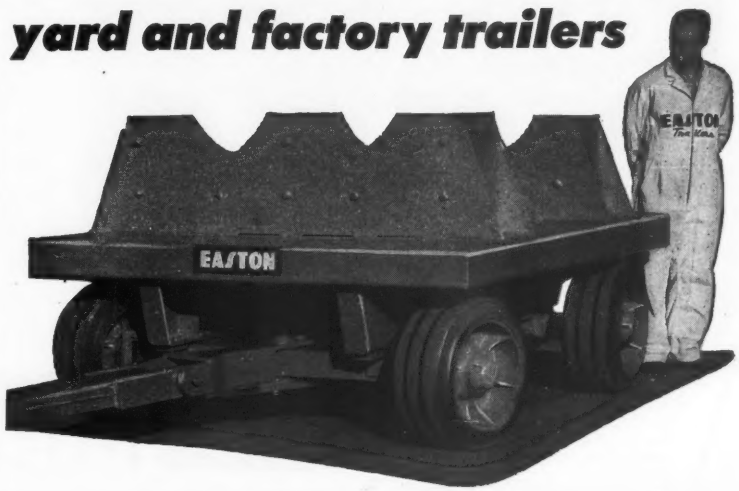

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10.55c; 200 to 1999 pounds, 10.90c; smaller lots 11.40c.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 201

Pittsburgh—Foundries are in comfortable position as to coke and no concern is expressed about prospects for the immediate future. Some stocks are available from producers outside the steel industry.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

5585 tons, East Bronx General Hospital, New York, to Harris Structural Steel Co., that city.

4770 tons, manufacturing building, G. E. Realty Corp., Rome, Ga., to American Bridge Co., Pittsburgh.

300 tons, estimated, trash racks for McNary dam, to Valley Iron Works, Yakima, Wash., by U. S. Engineer, Walla Walla, Wash.

205 tons, Archbishop Corrigan library, Yonkers, N. Y., through George A. Fuller & Co., New York, to Dreier Structural Steel Co. Inc., New York.

STRUCTURAL STEEL PENDING

2300 tons, transmission towers, assemblies, etc., Maupin-Detroit line No. 2, Bonneville Power Administration, Portland, Oreg.; Creamer & Dunlap, Tulsa, Okla., low prime bid, $583,562.

2200 tons, second section, Army ordnance plant, Birdsboro, Pa.; Valley Forge Associates in charge of construction.

1800 tons, two buildings, naval station, Quonset Point, R. I.

1550 tons, University of Washington teaching hospital, Seattle; bids in.

1500 tons, hangars for King county, Washington; bids in at Seattle.

1300 tons, power plant addition, Virginia Electric Co., Gilmerton, Va.; Stone & Webster Engineering Corp., Boston, contractor.

850 tons, power plant addition, Gulf States Utilities Co., Scott, La.; Stone & Webster Engineering Corp., Boston, contractor.

788 tons, state bridge, Herkimer county, New York; Collins Bros., Mechanicsville, N. Y., low on general contract.

786 tons, four warehouses, Veterans Administration, Somerville, N. J.; Hackart Construction Co., New York, apparently low on general contract.

665 tons, YMCA, New Britain, Conn.; Wadhams-May Co., Hartford, Conn., low on general contract.

565 tons, state highway bridge, Twilight-North Bellevernon boroughs, Pennsylvania, bids July 11, Harrisburg, Pa.

545 tons, state bridge, Onondaga county, New York; Massachusetts Northern Construction Co., low on general contract.

500 tons, stop logs, trash racks, beams, McNary dam fishway and pumphouse; Schmitt Steel Co., Portland, Oreg., low $165,535, to U. S. Engineer, Walla Walla, Wash.

432 tons, state bridge, Allegheny county, Pa., bids July 2.

415 tons, subway extensions, Flushing subway line, New York; L. I. Waldman & Co., that city, low on general contract.

300 tons, power plant addition, Savannah Electric Co., Savannah, Ga.; Stone & Webster Engineering Corp., Boston, contractor.

294 tons, state bridge, Monroe county, New York; Tomlinson Construction Co., low on general contract.

271 tons, state bridge, Philadelphia; bids July 11.

225 tons, fish weirs and equipment, McNary dam; Willamette Iron & Steel Co., Portland, Oreg., low $767,783, to U. S. Engineer, Walla Walla, Wash.

REINFORCING BARS . . .

REINFORCING BARS PLACED

600 tons, $3 million warehouse for General Services Administration, Seattle, to Soule Steel Co., Seattle.

REINFORCING BARS PENDING

925 tons (part furnished by the Navy), also 250 tons shapes, magazines and storehouses, Naval Ordnance Depot, Bangor, Wash.; general contract to Grove, Shepherd, Wilson & Kruge, Seattle, low $2,245,751.

810 tons, mesh and bars, highway and bridge, Twilight - North Bellevernon, Pennsylvania, bids July 11, Harrisburg, Pa.

224 tons, state viaduct, Union county, New Jersey; bids June 26.

175 tons, 24 million-gallon water reservoir; bids to J. L. Sugars, clerk, Everett, Wash., June 25.

165 tons, Washington state highway box girder bridge, Clark county; bids to Olympia, June 17.

100 tons plus, Washington state highway bridge, Stuck river; general award to Statewide Equipment Co., Tacoma, Wash., $98,503.

90 tons, state bridge, Philadelphia; bids July 11.

PLATES . . .

PLATES PLACED

2000 tons, including shapes, twelve barges and two steel lighters, for U. S. Navy to four contractors in Portland, Oreg., and Olympia, Wash.

500 tons or more, non-selfpropelled steel barges, Navy, to Albina Engine Machine Works, Portland, Oreg., $560,000.

PLATES PENDING

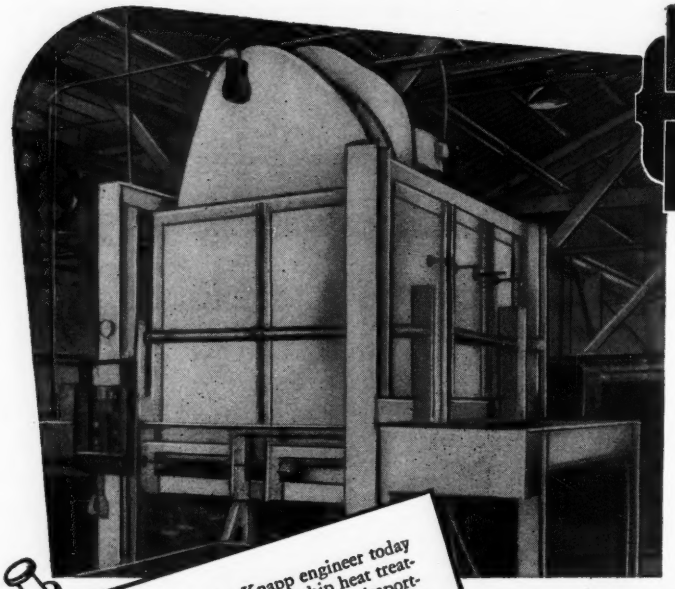
5000 tons, tanks, Tradeoil Inc., Philadelphia, bids asked.

188 tons, ⅜ and ¼ inch plate, 24 to 48 inch diameter pipe, Everett, Wash., water system expansion; bids to J. L. Sugars, clerk, June 25.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Pittsburgh & West Virginia, six 2000-hp road switching diesel-electric locomotive units, to Fairbanks, Morse & Co., Chicago.



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Here and There in Metalworking . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

Diamond Buys Spence Processes

Diamond Alkali Co. Cleveland, intensified its activities in the metallurgical field by acquiring processes owned by Spence Metals Research Co. Pittsburgh. Spence has developed several processes using fused alkali salts for desanding of both ferrous and non-ferrous castings, and the cleaning and descaling of stainless steels. Diamond has been the supplier of the basic alkali materials used in these metal cleaning processes, and is carrying on research and development to extend and improve the applications of the cleaning salts to the metallurgical industry.

Lynch Honored by ASM Chapter

Georgia chapter, America Society for Metals, honored Robert S. Lynch, president, Atlantic Steel Co., Atlanta, with its annual Metalworking Southeast award in recognition of his contribution to the metalworking industry and the ASM Georgia chapter.

Standard Wire Moves to Larger Office

Standard Wire & Cable Co. moved into its new office and sales building at 3440 Overland Ave., Los Angeles. The new quarters more than double the firm's previous space.

Dominion Gets Big Bridge Contract

Dominion Bridge Co. Ltd., Lachine, Que., was awarded the contract for fabrication and erection of the superstructure of a suspension bridge for the Halifax-Dartmouth Bridge Commission. The bridge to be erected across Halifax harbor will have a total length of 4420 feet. Total weight of the steelwork will be about 8200 tons. Completion of the $8 million project is scheduled for 1954.

Canadian Plant Damaged by Fire

Dominion Electrohome Industries Ltd. plant in Kitchener, Ont., was swept by fire recently with damage estimated at about $1 million.

Scrap Dealers Unite Operations

Hoyne Iron & Steel Co., and Chicago Metals Co., scrap dealers, Chicago, announce consolidation of their operations, with headquarters at 330 N. California Ave. Over-all expansion on 220,000 square feet of land adjacent to the Hoyne property will include a 30,000 square-foot warehouse for the nonferrous scrap operations of Chicago Metals. The consolidation, which will not affect company names for the present, is scheduled for completion by Sept 1.

Carborundum Gets $11 Million Order

Carborundum Co., Niagara Falls, N. Y., plans to produce zirconium and hafnium for the Atomic Energy Commission following receipt of an order totaling about $11 million from the government agency. A subsidiary, Carborundum Metals Co. Inc., was organized to make the metals and will establish new plant facilities.

Illinois Gear & Machine Expands

Illinois Gear & Machine Co. purchased property adjacent to its main office and works at 2108 N. Natchez Ave., Chicago. A building on the property will be used as a pattern shop and storage while the remainder of the land will be improved later as part of a $1 million expansion project.

Firm Promotes Electronic Machining

A new company, Sparcatron Ltd., was organized in England. This firm will grant licenses throughout the world under the Rudorff and other patents for the application of the new process of electronic machining of materials. The company established laboratories for pure and applied research in this field at Tuffley Crescent, Gloucester. The new company was formed by Bath & Portland Stone Firms Ltd., which also controls Impregnated Diamond Products Ltd., Gloucester.

Dollinger Buys Air Filter Business

Dollinger Corp., Rochester, N. Y., purchased the patents, tools and inventory for production of Raytheon electronic air filters for air conditioning units. The firm acquired the Spencer-Walther Lens Co. plant in Rochester to house the new operations, as well as part of the manufacturing handled in its present plant.

Colonial Appoints Representative

Colonial Broach Co., Detroit, manufacturer of broaching machines and equipment, and Colonial Bushings Inc., Fraser, Mich., producer of drill jig bushings, appointed Wear Associates, Dallas, as their representatives in northern Texas.

Alex Taub Establishes Headquarters

Alex Taub, formerly a leading designer of internal combustion engines in the automotive industry and chief engineer of the old Foreign Economic Administration of the early World

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Any shape that can be contained in a 6 inch circle. Any length up to 40 feet. Send drawings, specifications and data.

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Machines for 1/16" to 3/4" Rod. Rounds and Shapes.

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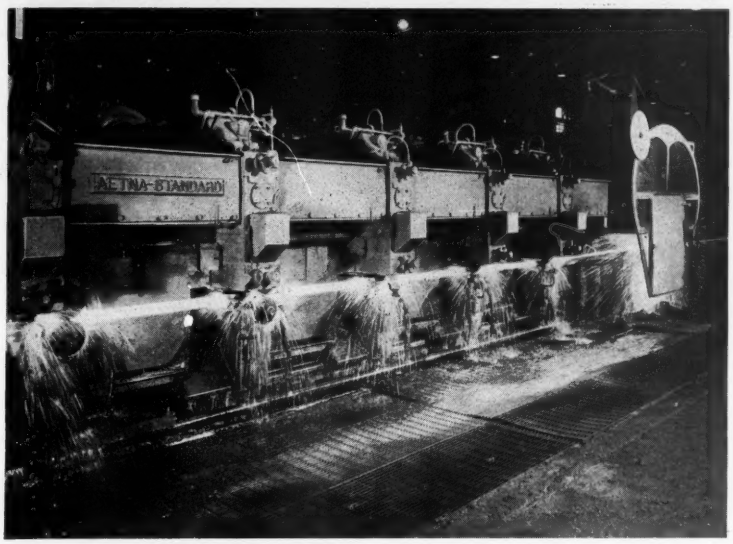

Pipe Goes Wheeling Along

As a strip of skelp leaves the furnace at the Wheeling Steel Corp.'s Benwood, W. Va., Works, it enters a 12-stand mill to be formed into pipe. The first stand bends the skelp into a tubular shape, and the succeeding mills weld it and reduce it to the desired size. The mill makes 1000 feet of pipe a minute

War II period, established offices and a laboratory for his Taub Engineering Co. at 6100 River Rd., Washington 16.

Crucible Steel Opens Warehouse

Crucible Steel Co. of America, Pittsburgh, opened a warehouse and branch office at 105 S. Keystone, Indianapolis. The warehouse is managed by C. A. Linsley.

Connors Opens Atlanta Office

Connors Steel Co., Birmingham, a division of H. K. Porter Co., Pittsburgh, opened sales offices at 1145 Peachtree St., Atlanta, and at 777 Court Ave., Memphis. William J. Califf Jr. is in charge of the Atlanta office while Willis C. Hagan is in charge of the Memphis office.

Atlas Pipe Inc. Gets Charter

Atlas Pipe Inc., Corpus Christi, Tex., was granted a charter to engage in the iron and steel business. Incorporators are W. H. Becker, Alvin Zwerneman and W. J. Steeger.

Apex Builds Plant in Northwest

Intermediate alloys containing aluminum and silicon will be produced by Apex Smelting Co., Chicago, in a commercial pilot plant which is being constructed in the Pacific Northwest. Clays will be used as a raw material. The alloys produced by a direct reduction process will be used by the company in its products and also will be available to other metal users. Production will be expanded as soon as optimum design is proved in its pilot operation.

Davis Electronics Moves

Davis Electronics moved to 4313 W. Magnolia Blvd., Burbank, Calif. Television antennas and other electrical equipment are manufactured.

Scully-Jones Appoints Distributor

Scully-Jones & Co., Chicago, appointed Hoffman-Baumruck Co., Philadelphia, as its representative in Delaware, eastern Pennsylvania and southern New Jersey for its standard and special production tools.

Hydraulic Equipment Changes Name

Hydraulic Equipment Co., Cleveland, is operating now as Hydreco, a division of New York Air Brake Co.,

WASHERS
—special sizes
—special shapes
—flat
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—standard sizes

We fabricate from:

lead	fusible metals
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clad bi-metals	brazing alloys
brass	bearing bronze
bronze	clock brass
copper	fibers
aluminum	plastics
block tin	special materials

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New York, instead of as a subsidiary of that company.

Drayer-Hanson Buys Engineering Firm

Drayer-Hanson Inc., Los Angeles, manufacturer of air conditioning equipment, purchased assets of Jackson Engineering Co., manufacturers of aerial coolers and shell and tube heat exchangers for petroleum and chemical industries.

Hagan Establishes New Division

Hagan Corp., combustion and chemical engineering firm in Pittsburgh, established an Aeronautical & Special Products Division "to meet a growing demand for high performance regulating and measuring devices" in aeronautical engine testing, gas turbine controls, blower controls, thrust and torque measurement, and similar problems. William F. Waina is manager of the new division.

Topper Equipment Building Plant

Topper Equipment Co., Matawan, N. J., manufacturer of vapor degreasing and steam cleaning equipment, is constructing a plant in Clark township (Rahway), New Jersey. The Matawan plant is designated as Plant No. 2 while the new one will be Plant No. 1. Topper Equipment recently purchased the degreasing equipment business of Optimus Equipment Co., a subsidiary of Hanson-Van Winkle-Munning Co., Matawan.

CEC Instruments Inc. Organized

Consolidated Engineering Corp., Pasadena, Calif., organized a subsidiary, CEC Instruments Inc., to handle sales and service work on instruments manufactured by the parent company. Philip S. Fogg is president of both companies.

Industrial Supply Formed in Phoenix

A new steel firm, Industrial Supply Co. was established at 2626 E. Washington, Phoenix, Ariz. Founder of the business, largely steel warehousing, is Ted Coltrin. A full line of steel products will be stocked, including structurals, bars, plates, sheets and cold-finished steel. Also to be stocked are bolts and nuts, heavy hardware, such as tools, chain and hoists.

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MCKAY ½" TO 2" FOUR-HIGH LEVELLER, 15" Diameter Rolls, (9) Levelling Rolls, (11) backing up rolls, (2) Pinching rolls, (1) 300 HP motor for main drive, (2) 10 HP motors for screw down and (1) 2 HP motor for pinch roll adjustment.

MCKAY ¼" TO 2" TWO-HIGH LEVELLER, 13" Diameter Rolls, (11) Levelling rolls, (2) Pinching rolls, with (1) 150 HP motor for main drive, (2) 7½ HP motors for screw down.

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1400 TON COMBINED CAPACITY, BLISS #2 ET-10 TRIPLE ACTION TOGGLE, 650 Ton, 39" stroke, 75" shut height of plunger, 400 Ton, 28" stroke, 72" shut height of blankholder,

350 Ton, 12" stroke of lower ram, 62" x 86" bed area.

525 TON, BLISS #410A DOUBLE ACTION TOGGLE, 25" stroke, 62" shut height of plunger, 17" stroke, 60" shut height of blankholder, 60 x 84 bed area.

255 TON, TOLEDO #96-D DOUBLE CRANK, STRAIGHT SIDE, 6" stroke, 30" shut height, 51 x 87" bed area.

255 TON, #8-E BLISS DOUBLE CRANK, STRAIGHT SIDE, 8" stroke, 32" shut height, 42 x 108" bed area.

180 TON, #70-D CLEVELAND DOUBLE CRANK, STRAIGHT SIDE, 18" stroke, 32" shut height, 40 x 84" bed area.

125 TON, TOLEDO #S-56 TWIN TYPE O.B.I. PRESSES ON S. S. BASE, 3" stroke, 25 x 25" bed area, 12½" shut height.

88 TON, TOLEDO #92½ DOUBLE CRANK, GAP FRAME, 8" stroke, 34 x 66" bed area, 20" shut height.

88 TON, BLISS #4D DOUBLE CRANK, GAP FRAME, 2¼" stroke, 38 x 53½" bed area, 9¼" shut height.

87 TON, BLISS #4½ STRAIGHT SIDE, 4½" stroke, 21 x 27 bed area, 14½" shut height.

75 TON, WELLS DOUBLE CRANK GAP FRAME, 2" stroke, 20 x 80" bed area, 11⅛" shut height.

60 TON, TOLEDO, #203-E DOUBLE CRANK GAP FRAME, 4" stroke, 13 x 55½" bed area, 16" shut height.

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Box, Single Sheathed, 50-Ton
Cabooses, Eight Wheel, Cupola Type
Flats, 40-and 50-Ton, Steel Underframe, 40'0"
Gondolas, Composite, 40-Ton Capacity
Gondolas, Composite or All Steel, 50-Ton and 70-Ton
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Hoppers, Twin, All-Steel, 50-Ton, Cross Dump
Hoppers, All-Steel, 70-Ton, Cross Dump
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40 & 50-Ton Capacity, Length 70' and 74'

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Four—30-Yd., 50-Ton Cap., All Steel, Side Dump (Drop Door)
End Dump, 20-Yd., 50-Ton Drop Door **End** Dump, 10-Yd., 30-Ton Lift Door
Side Dump, 16-Yd., 30-Ton Lift Door

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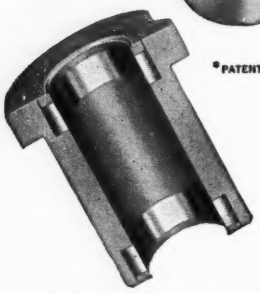

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New Plant a Potent Weapon in Backlog War

When the Lindberg Engineering Co., Chicago, opened Plant No. 2, partly shown above, it gained an extra 6200 square feet to help catch up on order backlogs. The new plant will make laboratory furnaces, small induction heating units, Fisher-type melting furnaces and atmosphere generators, thus relieving the main plant to speed up production of large industrial heat-treating furnaces

Bethlehem Expansion Certified

Bethlehem Pacific Coast Steel Corp., Bethlehem, Pa., received a certificate of necessity from NPA for a $215,000, expansion of its South San Francisco plant. The expenditure includes improvement of equipment and is an extension of a program under way since the end of World War II.

Gorham Names Northwestern Agent

Gorham Tool Co., Detroit, appointed J. E. Haseltine & Co., as its distributor in the Northwest. Haseltine maintains offices and warehouse facilities in Portland and Eugene, Oreg.; Seattle and Spokane, Wash.

Stockham Buys Wedgeplug Valve Co.

Stockham Valves & Fittings Co., Birmingham, purchased Wedgeplug Valve Co. Inc., New Orleans. The new owner plans to enlarge the plant in the latter city.

Just Mfg. Moves Into New Plant

Just Mfg. Co. moved into its new plant in Franklin Park, Ill. The building provides twice the space available in the old quarters of this manufacturer of steel cabinet sinks and other sheet metal products.

Kupfrian Mfg. Buys Building

Kupfrian Mfg. Co., Binghamton, N. Y., producer of flexible shafting, universal joints, wire shielding and remote controls purchased a building at 395 State St., that city. Upon completion of alterations and additions to the structure, the office and major production facilities will be located at the new address.

IBM Ltd. Plans $2 Million Addition

International Business Machines Co. Ltd. will erect a $2 million extension to its plant in Toronto, Ont.

Aero-Test Equipment Chartered

Aero-Test Equipment Co. Inc., Dallas, was granted a charter to engage in the iron and steel business. Incorporators are Truman W. Howard Jr., Keats E. Soder and Catherine E. Howard.

Westinghouse Opens Alabama Plant

Westinghouse Electric Corp., Pittsburgh, started small scale production in its new lamp plant at Reform, Ala. It may be another year or more before the firm reaches full production at this plant.

Hall-Scott Appoints Representative

Hall-Scott Motor Division, ACF-Brill Motors Co., Philadelphia, appointed Western Tool & Mfg. Co., Casper, Wyo., as its dealer in the Rocky Mountain area for its engines and service parts.

Motorola Division Opens Branch

Communications & Electronics Division, Motorola Inc., Chicago, opened a parts and service department at 811 South B St., San Mateo, Calif. John Jipp, former sales manager of the division's southwestern states region, is in charge.

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Advertising Index

Air Reduction 206
Ajax Electric Co., Inc. 91
Alliance Machine Co., The 180
Aluminum Company of America 30, 31
Aluminum Company of America, Chemicals Division 103
American Pulverizer Co. 170
American Steel & Wire Division, United States Steel Co. 17, 22
American Wheelabrator & Equipment Corp. 212, 213
Angier Corporation 166
Armco Steel Corporation 62

Baker Brothers, Inc. 171
Barium Steel Corporation 2
Bellows Co., The 152
Belmont Iron Works, The 218
Bethlehem Steel Co. 1
Bixby, R. W., Inc. 221
Blaw-Knox Co., Pittsburgh Rolls Division 45
Bliss, E. W., Co. 27
Bolin & Co. 214
Brandt, Charles T., Inc. 190
Bridgeport Chain & Mfg. Co., The 160
Brown & Sharpe Mfg. Co. 39, 40
Browning, Victor R., & Co., Inc. 218
Buffalo Forge Co. 32
Bullard Co., The 80

Carborundum Co., The 54, 55
Carpenter Steel Co., The 106
Century Electric Co. 161
Chambersburg Engineering Co. 178
Clayton Manufacturing Co. 169
Cleveland Chain & Mfg. Co., The 160
Cleveland Steel Tool Co., The 214
Cleveland Worm & Gear Co., The ..... Inside Back Cover
Colorado Fuel & Iron Corporation, The, Wickwire Spencer Steel Division 185
Columbia-Geneva Steel Division, United States Steel Co. 17, 20, 21, 22, 38, 153
Consolidated Products Co., Inc. 221
Continental Foundry & Machine Co. 139
Copperweld Steel Co. 83
Cowles Tool Co. 214
Crucible Steel Company of America 183
Cullen-Friestedt Co. 170
Cutler-Hammer, Inc. ..... Back Cover

Danly Machine Specialties, Inc. 13
Delta Power Tool Division, Rockwell Manufacturing Co. 145
Dempster Brothers 177
Denison Engineering Co., The 7
Detroit Stamping Co. 219
Diamond Mfg. Co. 218
Differential Steel Car Co. 184
Du Pont, E. I., de Nemours & Co., Inc. 29

Eastern Machine Screw Corp., The 214, 220
Easton Car & Construction Co. 215
Eaton Manufacturing Co., Reliance Division 94
Electric Controller & Mfg. Co., The ..... Inside Front Cover
Electric Equipment Co. 221
Elgin National Watch Co. 5
Enterprise Galvanizing Co. 218
Enthone, Inc. 46

Fairbanks, Morse & Co. 165
Federal Machine & Welder Co., The 175
Felters Co., The 172
Firestone Steel Products Co. 65
Fischer Special Mfg. Co. 214
Flynn, Michael, Manufacturing Co. 217
Follansbee Steel Corporation 164
Foster, Frank B., Inc. 221
Foster, L. B., Co. 221

Continued on following page

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Advertising Index

Concluded from preceding page

Gallmeyer & Livingston Co. 49
Gardner-Denver Co. 28
Goodyear Tire & Rubber Co., Inc., The 4
Gorham Tool Co. 12

Hanson-Van Winkle-Munning Co. 52
Harbison-Walker Refractories Co. 34, 35
Harnischfeger Corporation, Overhead Crane Division 56
Hendrick Manufacturing Co. 210
Hevi Duty Electric Co. 176
Homestead Valve Manufacturing Co. 174
Hoover Co., The, Kingston-Conley Division 187
Houghton, E. F., & Co. 155

Iron & Steel Products, Inc. 221

Jackson Iron & Steel Co., The 214
Jandru Steel Corp. 220
Jessop Steel Co. 57

Kelite Products, Inc. 179
Kidde, Walter, & Co., Inc. 10
King Fifth Wheel Co. 148
Kingston-Conley Division, The Hoover Co. 187
Kinnear Manufacturing Co., The 182
Knapp, James H., Co., Inc. 216

Laclede Arch Co., Division of Laclede-Christy Co. 147
Lamson & Sessions Co., The 105
Landis Machine Co. 14
Landis Tool Co. 9
Lapointe Machine Tool Co., The 11
La Salle Steel Co. 53
Lead Alloy Products Co. 219
Lebanon Steel Foundry 223
Lee Rubber & Tire Corporation Republic Rubber Division 209
Leeds & Northrup Co. 200
Lewis Machine Co., The 218
Link-Belt Co. 15
Luria Brothers & Co., Inc. 205

McKay Machine Co., The 75
McKee, Arthur G., & Co. 143

Macwhyte Co. 3
Marsam Corporation 154
Mathews Conveyor Co. 219
Mead Specialties Co. 151
Mettler Machine Tool, Inc. 158
Meyers, W. F., Co., Inc. 222
Midvale Co., The 26
Molybdenum Corporation of America 194
Motch & Merryweather Machinery Co., The 167

National Acme Co., The 16
National Steel Corporation 33
National Tube Division, United States Steel Co. 17, 22, 38
New York & New Jersey Lubricant Co. 158
Norton Co. 44
Nox-Rust Chemical Corporation 163

Ohio Hoist & Mfg. Co. 160
Ohio Locomotive Crane Co., The 214
Orton Crane & Shovel Co. 168
Osborn Manufacturing Co., The 93

Parker Rust Proof Co. 24, 25
Paul's Machinery Co. 220
Pawtucket Manufacturing Co. 6
Penn Iron Works, Inc. 211
Pheoll Manufacturing Co. 87
Pittsburgh Rolls Division of Blaw-Knox Co. 45
Pittsburgh Steel Co. 48
Plating & Galvanizing Co., The 160
Potter & Johnston Co., Subsidiary of Pratt & Whitney Division Niles-Bement-Pond Co. 76

Reliance Division, Eaton Manufacturing Co. 94
Republic Rubber Division, Lee Rubber & Tire Corporation 209
Republic Steel Corporation 202
Richards-Wilcox Mfg. Co. 188
Roebling's, John A., Sons Co. 41
Round California Chain Co. 160
Round Chain & Mfg. Co., The 160
Round Chain Companies 160
Round Los Angeles Chain Corp. 160
Round Seattle Chain Corp. 160
Ryerson, Joseph T., & Son, Inc. 66

St. Joseph Structural Steel Co. 221
Sargeant & Wilbur, Inc. 224
Simonds Abrasive Co. 189
Simonds Gear & Mfg. Co., The 223
Simonds Saw & Steel Co. 51
Solar Steel Corporation 162
Southern Chain & Mfg. Co., The 160
Sperry Products, Inc. 193
SPO, Inc. 156, 157
Stalwart Rubber Co. 140
Surface Combustion Corporation 42, 43

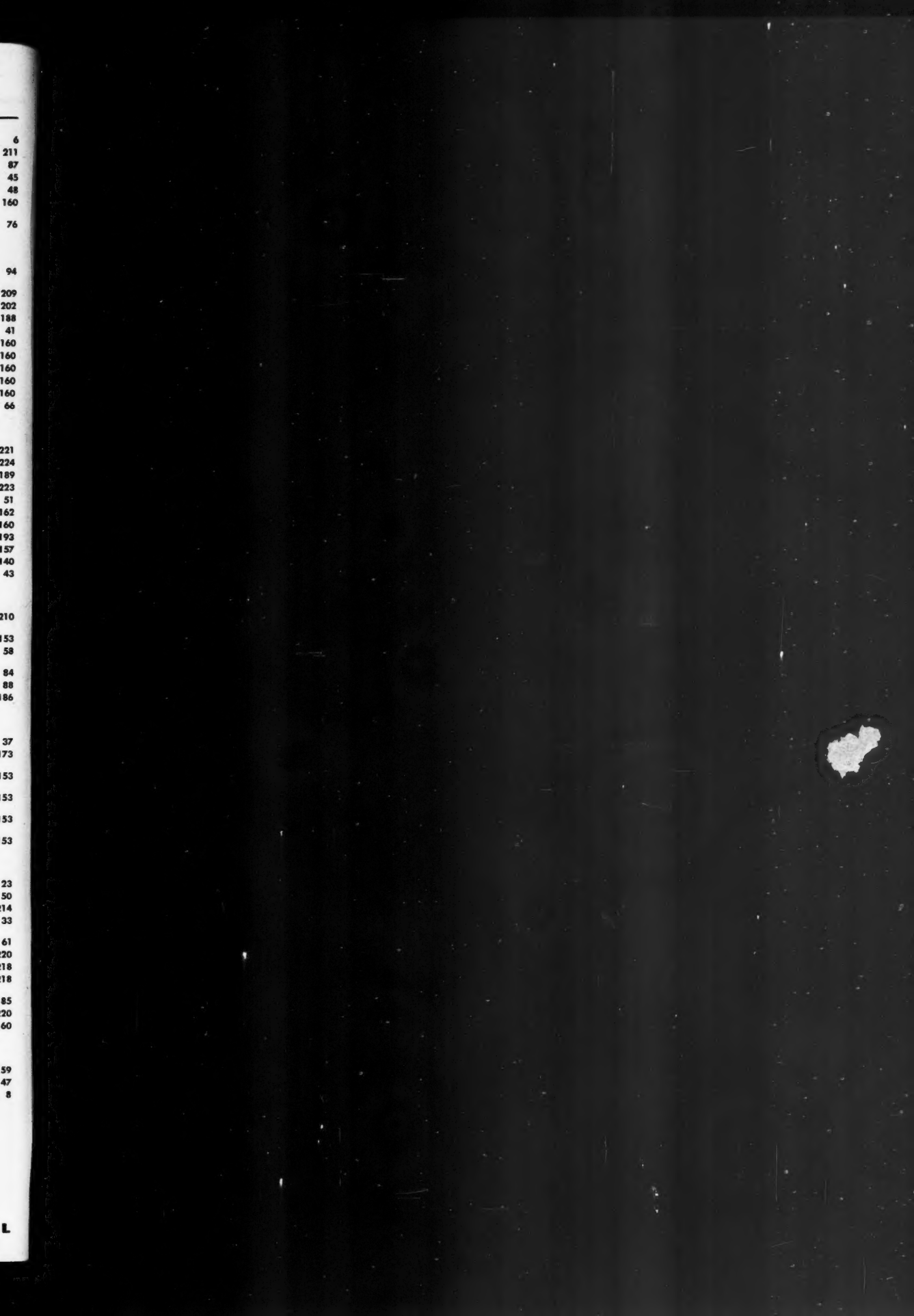
Teiner, Roland, Co., Inc. 210
Tennessee Coal & Iron Division, United States Steel Co. 17, 20, 21, 22, 153
Texas Co., The 58
Timken Roller Bearing Co., The, Steel & Tube Division 84
Tinnerman Products, Inc. 88
Torrington Manufacturing Co., The 186

Union Chain & Manufacturing Co., The 36, 37
United Engineering & Foundry Co. 173
United States Steel Co. 17, 18, 19, 20, 21, 22, 38, 153
United States Steel Corp., Subsidiaries 17, 18, 19, 20, 21, 22, 38, 153
United States Steel Export Co. 17, 20, 21, 22, 38, 153
United States Steel Supply Division, United States Steel Co. 17, 20, 21, 22, 153

Warner & Swasey 23
Waterbury Farrel Foundry & Machine Co. 50
Webb Corp., The 214
Weirton Steel Co. 33
Westinghouse Electric Corporation, Sturtevant Division 61
West Penn Machinery Co. 220
Wheeling Steel Corporation 218
Whitehead Stamping Co. 218
Wickwire Spencer Steel Division of The Colorado Fuel & Iron Corporation 185
Wilkie Die Products Co. 220
Woodhouse Chain Works 160

Yale & Towne Manufacturing Co., The 159
Yoder Co., The 47
Youngstown Sheet & Tube Co., The 8

~ ~ ~

Table of Contents Page 5

Classified Advertising Pages 220, 221